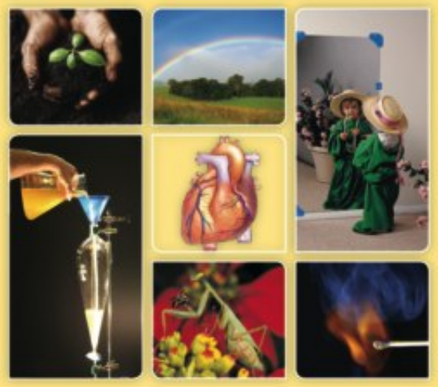
Science 5 & You



This book is mainly built for teaching and learning science for our sons, through developing their skills of observation, inquiry, comparison and deduction.

The content of this book is set according to the national standards and indicators of the ministry of education.

We hope that the content of the book would be enjoyable for both students and teachers as well as to achieve the Egyptian educational policy.

الشروق
الحديثة للطباعة والتغليف

Arabic Republic of Egypt
Ministry of Education
Book Sector

Science 5 & You

2015 - 2016

غير مصرح بتداول هذا الكتاب
خارج وزارة التربية والتعليم

Fifth Primary
First Term

Student's Book

Arabic Republic of Egypt
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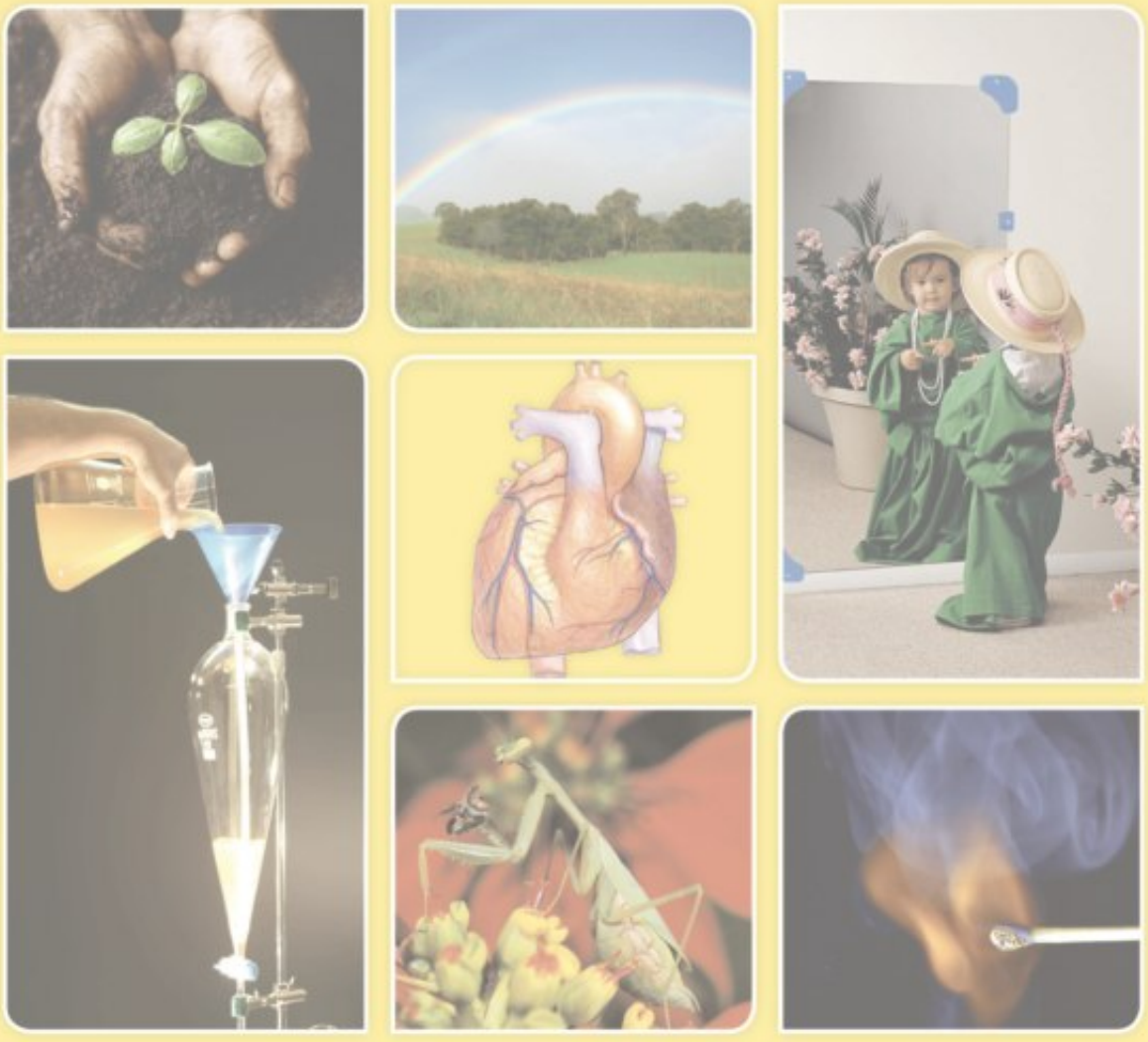
Science & You 5



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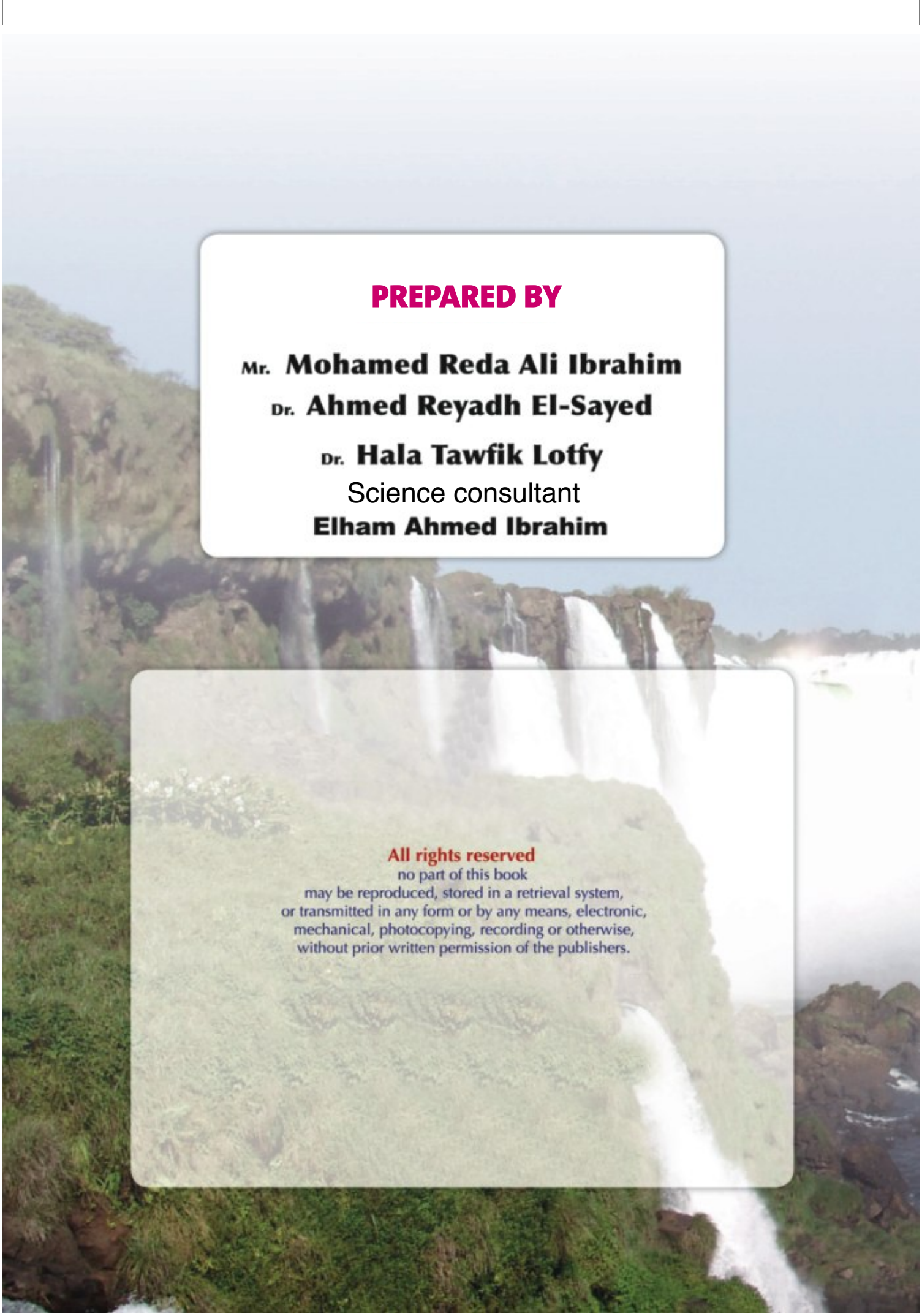

PREPARED BY

Mr. **Mohamed Reda Ali Ibrahim**

Dr. **Ahmed Reyadh El-Sayed**

Dr. **Hala Tawfik Lotfy**

Science consultant

Elham Ahmed Ibrahim

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Preface

This book **Science and You** achieves the objectives of developing curricula in order to cope with the 21st century. According to the following educational directions:

- Activating the relation between Science and Technology in the science domain and its reflection on the development process.
- Emphasizing the suitable situations that distinguish the effect of the scientific and technological progress in producing knowledge.
- Selecting students practicing their active and conscious behavior toward using the technological outcomes.
- Developing students' abilities in the scientific thinking methodology, then the possibility to move from learning depending on receiving knowledge to learning depending on self-learning in an atmosphere of joy and amusement.
- Exploring information and gain much experiences through developing the essential thinking skills such as observation, analysis, concluding and reasoning.
- Providing opportunities to students for practicing citizenship through the methods of self-learning and the team work spirit, negotiating and confessing, accepting others and rejecting extremists.
- Enriching students with various life skills, and the practical capabilities through increasing all interests in the practical and scientific domain.

Science and You contains four integrated units, each one contains a set of integrated lessons achieving the concerned objectives.

We hope that this book may benefit our sons for the favour of our country Egypt.

Preparation Team

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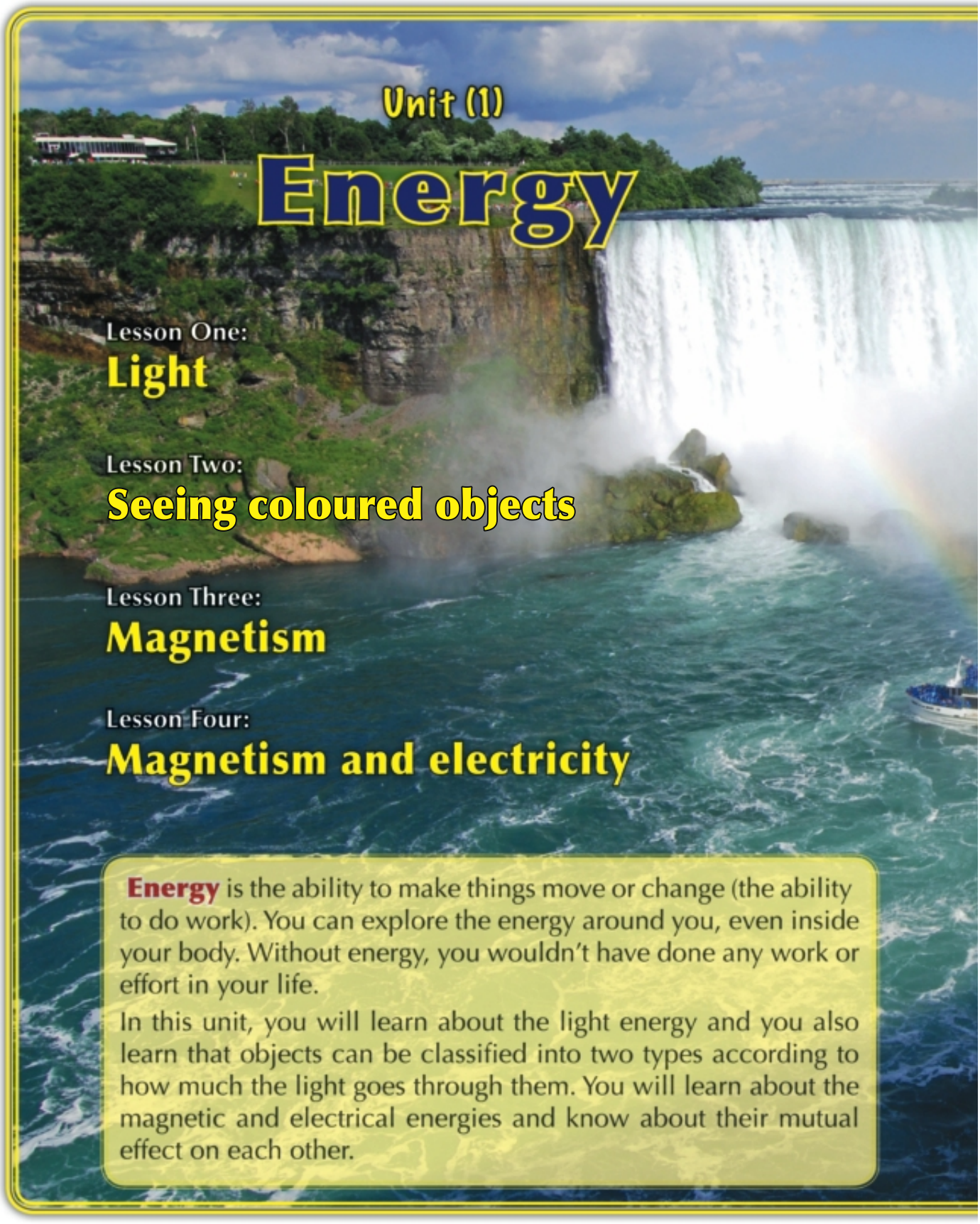
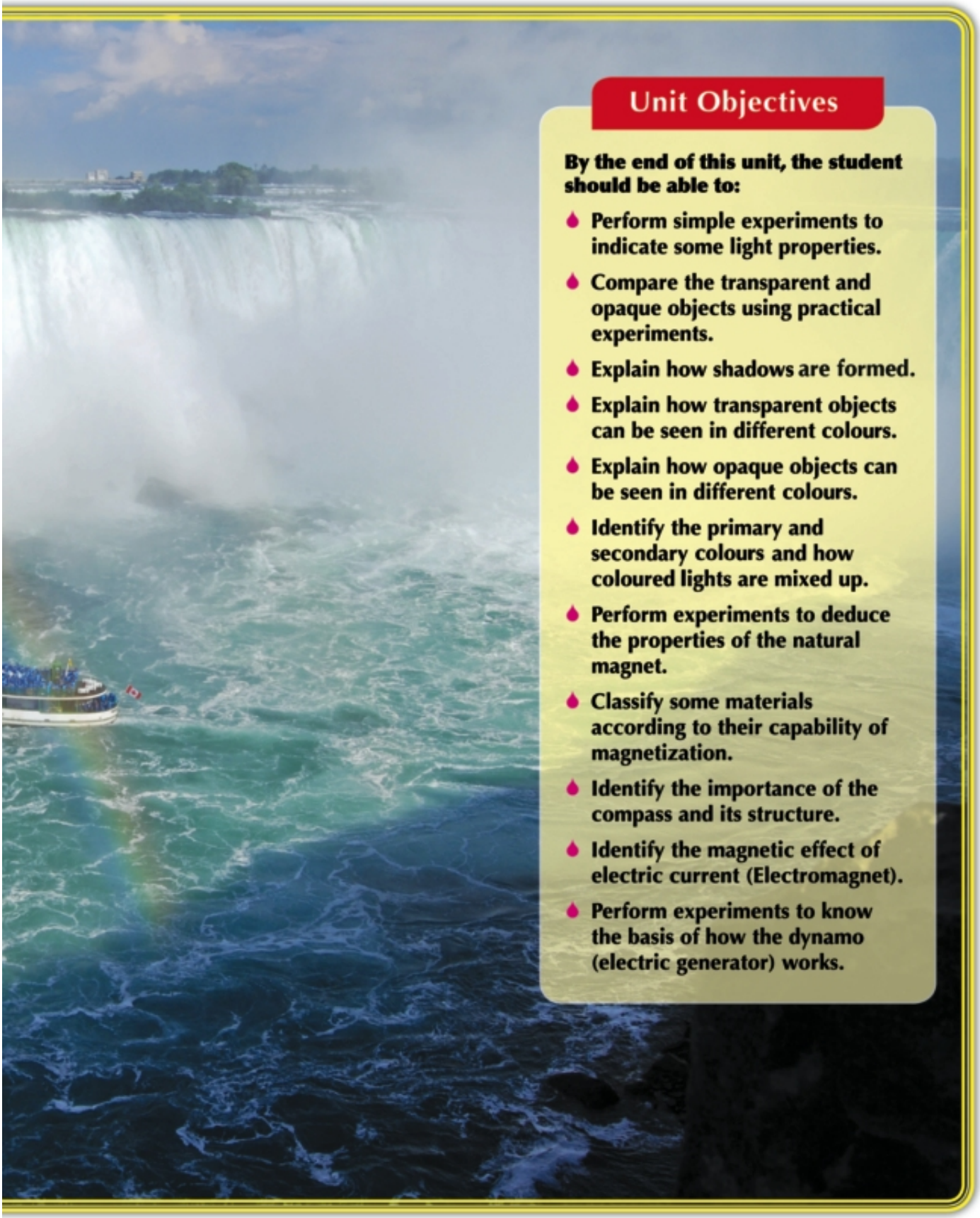

Unit (1)
Energy
Lesson One:
Light
Lesson Two:
Seeing coloured objects
Lesson Three:
Magnetism
Lesson Four:
Magnetism and electricity
Energy is the ability to make things move or change (the ability to do work). You can explore the energy around you, even inside your body. Without energy, you wouldn't have done any work or effort in your life.
In this unit, you will learn about the light energy and you also learn that objects can be classified into two types according to how much the light goes through them. You will learn about the magnetic and electrical energies and know about their mutual effect on each other.



Unit Objectives

By the end of this unit, the student should be able to:

- Perform simple experiments to indicate some light properties.
- Compare the transparent and opaque objects using practical experiments.
- Explain how shadows are formed.
- Explain how transparent objects can be seen in different colours.
- Explain how opaque objects can be seen in different colours.
- Identify the primary and secondary colours and how coloured lights are mixed up.
- Perform experiments to deduce the properties of the natural magnet.
- Classify some materials according to their capability of magnetization.
- Identify the importance of the compass and its structure.
- Identify the magnetic effect of electric current (Electromagnet).
- Perform experiments to know the basis of how the dynamo (electric generator) works.

Lesson (1 - 1)

Light

Objectives

By the end of this lesson, the student should be able to:

- Explore that light travels in straight lines.
- Explain how shadow is formed.
- Classify some materials, according to light passing through.
- Identify light reflection.
- Identify light refraction.
- Identify how light is separated.
- Explore that the visible white light can be separated into seven colours.

What is light?

1. Use the photo in (Fig.1) to identify some sources of light which you know like ....., ... and .....

2. Did you know that light is a form of energy?
It is an energy form which can be seen.

3. The main light source on the Earth's surface is the sun.
Also, the moonlight is the sunlight that falls. on the moon's surface then reflects out.

The sun is the main source of light.

Lightened lamps is a source of light.

The moonlight is the reflection of the sunlight that falls on its surface. so, it is not a source of light.

Fig.(1)
Some sources of light

- List the other forms of energy which you studied:
  ....., ..., and .....
- Can you see such forms of energy? Light energy which can be seen is called the visible spectrum.

How does light travel?

Activity Light travels in straight lines

- **Materials:** Three cartoon or wood partitions each contains a hole in its center and a candle (light source).
- **Steps:**
  1. Work with your classmates to do this activity.
  2. Place the three partitions on a straight line in front of the lightened candle.
  3. Look at the candle light through the partition hole near you. (Fig. 2)
  4. Adjust the partitions position by moving them to the right and left until you see the candle light through the three holes.
- **Infer:** Is it necessary to place all the holes on a straight line to see the candle light? Why?
  5. Move a partition to the left or right. Do you see the candle light?
- **What do you infer?**

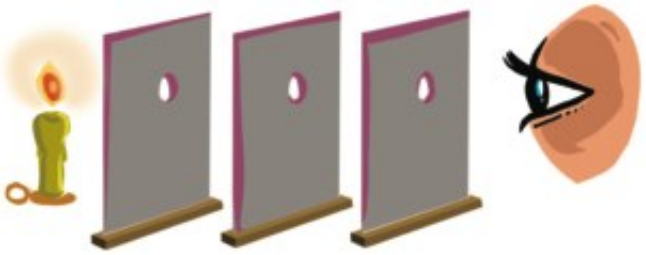


Fig.(2)
Is it necessary to place all the holes on a straight line to see the Candle´s light?

What have you learnt?
Candle´s light can be seen when the three holes are on the same straight line with the light of the candle.
* **Light travels in straight lines.**

Activity Light travels in straight lines

- **Materials:** a cartoon box- a candle (light source) a piece of card paper.
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Remove a side of the box then paste a piece of semi-transparent paper instead.
  3. Bore a small hole in the side opposite to the semi-transparent paper side.
  4. Place the lightened candle in front of the hole and for a distance, then look at the semi-transparent paper.
  5. Move the candle forward and backward until you see the candle picture clear on the semi-transparent paper as in Fig. (3).

Did you know?
The idea of the photographic camera is based on the idea of this activity.

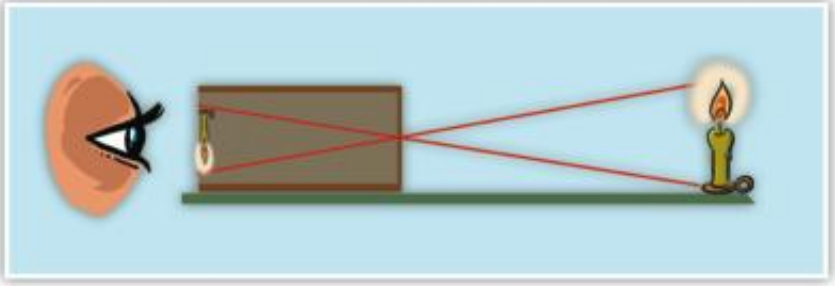


Fig. (3)
Formation of images by using of the narrow holes, because light travels in straight lines.

- **Infer:**
  - Is the image magnified or minimized?
  - Is the image inverted or upright?
  - Do the image characteristics get changed by approaching the candle or taking it away?

What have you learnt?
The candle's image is minimized and inverted. This indicates that light travels in straight lines.

Activity How does shadow form?

- **Steps:**
  1. Place your hand between a light source and the wall.
  2. What do you see on the wall?
  3. How can you interpret the shadow formation?
- **Think!**

  Does shadow get formed if the light has not travelled in straight lines?

Shadow represents the darkened area which is formed as a result of light falling on an opaque object. The shadow formation is an evidence that the light travels in straight lines.

Shadow area is changed as the object position is changed with respect to the light source (Fig. 4).

The nearer the object to light source is the bigger the object shadow becomes.

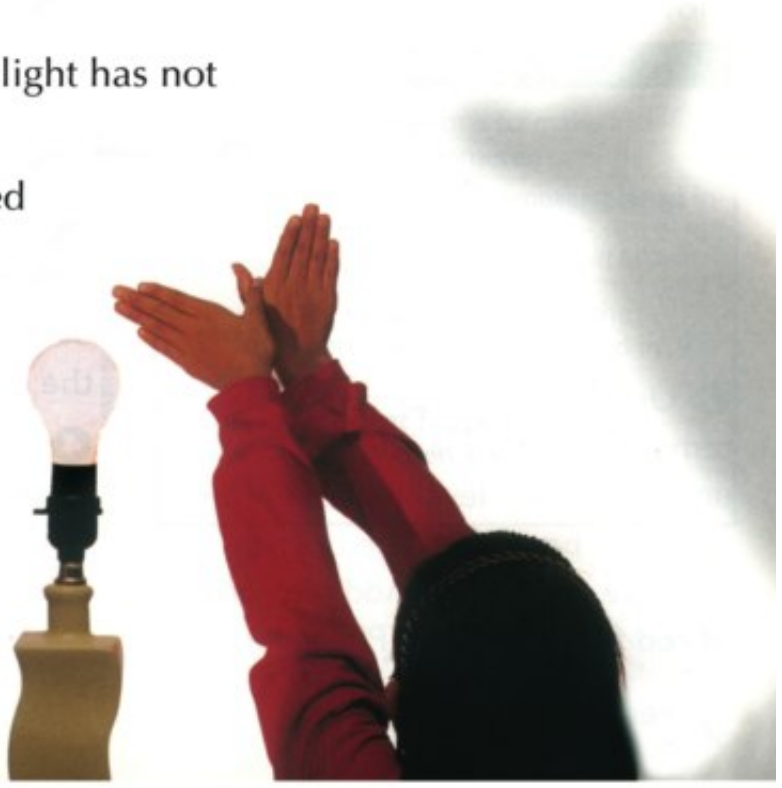


Fig. (4)
Shadow is the darkened area which is formed as a result of light falling on an opaque object.

What you have learnt?
Light travels in straight lines.

Transparent and opaque objects

Activity Light transmission through different materials

- **Look at the opposite pictures:**
  - **Picture 1 :** A glass sheet is placed on a picture (Fig. 5-1) .Do you see the picture behind the glass clearly?
    - You can clearly see the picture since the glass is a transparent material.
    - Tell another transparent material.
  - **Picture 2 :** A paper tissue is placed on the picture (Fig. 5-2). Do you see the picture as clearly as it was in case of the glass sheet?
    - The picture is less clear. The tissue is a semi-transparent material.
    - Tell another translucent material.
  - **Picture 3 :** A piece of cartoon paper is placed on the picture (Fig. 5-3).
    - Do you see the picture?
    - You don't see it. The cartoon paper is an opaque material.
    - Tell another opaque material.
- **Infer:**

Can all objects be seen behind all materials?

Fig. (5)
Transparent, opaque and semi transparent materials

Terms

- Transparent material: Is the material which objects can be clearlty seen behind.
- Semi-transparent material: Is the material which objects can be less clearlty seen behind than the transparent one.
- Opaque material: Is the material that doesn't allow the light travelling through and objects behind can't be seen.

Activity

Comparing the transparent and opaque objects

- **Materials:** a small object - a partition of white construction paper - an electric torch - a thin piece of transparent plastic - a paper tissue - a piece of an aluminium foil.

Think and discuss
Which is the kind of materials that can be used to cover windows of the darkens photographing rooms?

- **Steps:**

1 Use the following table to record your observations.

2 Place the small object on the table then have a classmate to hold the piece of the white construction paper behind the object in a constant distance.

Type of material placed in front of the tourch	Characteristics of the object shadow
No material	
Transparent plastic	
A tissue paper	
A sheet of aluminium foil	

3 Darken the room, then switch the torch on. Make the light fall on the object and observe the object shadow (Fig. 6-A). What are the specifications of the shadow? Is the shadow clear and its edge is sharp?
Record the shadow specifications in the table.

4 Place the transparent plastic piece in front of the torch (Fig. 6-B). What are the specifications of shadow in this case?

Fig. (6) Transparent and opaque materials

The material	Kind of material
1	
2	
3	
4	

5 Repeat step 4 using the tissue then the aluminium foil sheet. Record the specifications of shadow in each time in a table.

6 Classify the materials you have used in this activity into transparent, translucent and opaque materials.

What have you learnt?

- Materials can be classified as transparent, translucent and opaque according to the amount of light that transmits through them. Since light transmits through transparent materials, you can see what's behind.
- Light transmits also through translucent materials and you can see what's behind but things behind are not as clear as the transparent materials.
- Light never transmits through the opaque materials, and so you can't never see through.

Light reflection

If you stand facing a mirror , you can see your image across the mirror with distance the same as from the origin to the mirror. Have you ever asked yourself how this takes place. To answer this question, you must think about how we can see things surrounding us.

We can see things because they reflect the falling light on them to reach our eyes and so we can see them.

- If you enter a completely darkened room, why you can't see objects inside?
- If you turn on the lamp of this room, can you see objects inside?
- Explain how you can see these objects.

- In fig **7A:** When you stand facing a plane mirror, you can see your image. Mirror's surface is smooth and bright, so if light falls on, it will be reflected back. This light bouncing is known as «light reflection». Reflected light reaches your eyes directly, so you can see your picture. This reflection is known as «regular reflection».
- In fig **7B:** When you face a piece of white paper, can you see your image? Paper's surface isn't as smooth and bright as the plane mirror surface, but it is the same as the surface of most objects that contain protrusions and extremely tiny holes; so, when light falls on the paper's surface, it reflects and scatters light in different directions and what you see is the paper only. This reflection is known as «irregular reflection».

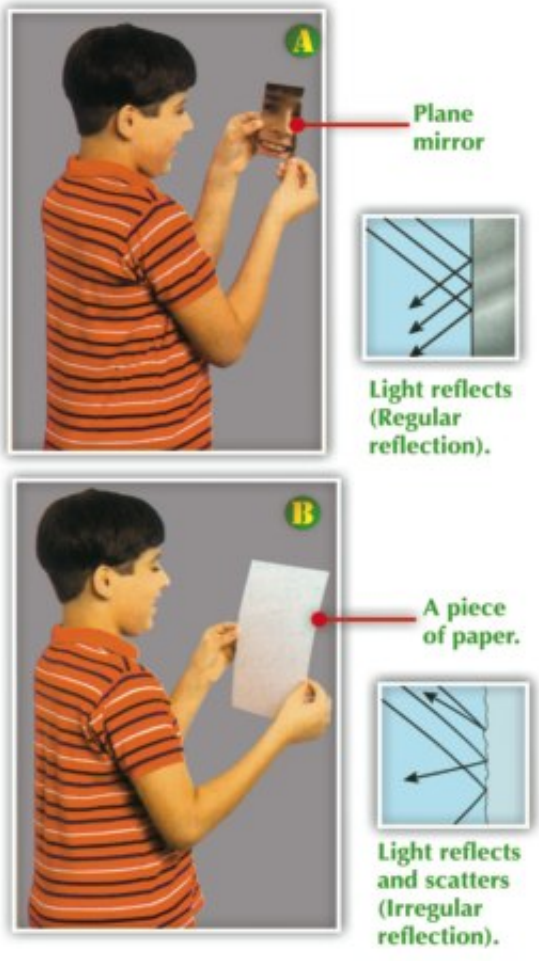


Fig. (7) Materials and light reflection

Light refraction

Look at the pencil inside a glass of water, have you thought why the pencil stem seems as if it was broken at the water's surface? This phenomenon results from refraction of the reflected light coming from the part of the pencil found under water surface.

- **Light refraction:** when light rays enter a new medium at an angle, the change in its speed causes them to bend, or change direction.

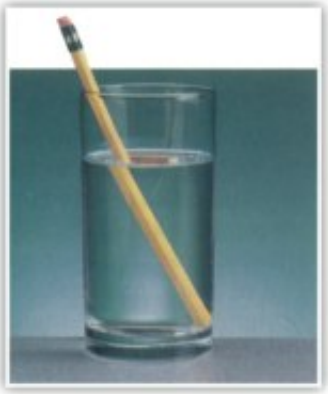


Fig. (8) Light refraction is clearly shown by putting a pencil inside a glass of water.

The reflected light rays from the pencil travel in air so they don't refract, but light rays which reflect from the part of pencil in water travel through water first before they reach the air. Light speed in air is faster than in water, so the reflected light rays from pencil under water have a certain speed. As soon as they transfer through air, their speed increases causing refraction of light rays. So, you can see the pencil look broken.

fig (9)
By moving the prism, you can see different colors.

Activity Light separation

- **Materials:** a white paper, a triangular glass prism, colouring pencils.
- **Steps:**

1 Work with your classmates to conduct this activity.
2 Hold the white paper and let the sun rays shine on it. Adjust your position where the sun is behind you. How does the sunlight seem on the paper?
3 Hold a prism and let the sunlight shine through. Move the prism until the sunlight coming from the prism strikes the white paper. Continue moving the prism until you see different colours.
4 What are the colours you can see?.
5 Use colouring pencils to draw the colours you have seen with the same order.

- What do you infer of this activity?
- By using a prism, the visible white light can be separated into seven colours (Fig.9), these colours are: red, orange, yellow, green, blue, indigo and violet.

Spectrum colours:

Visible spectrum is made up (consists of) seven colours. On passing white light through a glass prism, it separates into those seven colours - red, orange, yellow, green, blue, indigo and violet. We can see the rainbow When sunlight passes throught water droplets during rain falling or the suspended droplets in air.

Once these seven colours accumulate with each other, you can see the white light. Sunlight is an excellent example of white light.

Fig. (10)
The Rainbow

Lesson (1 - 1) Exercises

1 Put (✔) or (✘) and correct the wrong ones:

a Object's shadow is formed because light travels in curved lines.

b The moon seems luminous because it reflects the sunlight.

c The picture formed in the plane mirror is inverted.

2 Complete the following sentences:

a The material in which light can transmit through is called .....

b The change in the direction of light rays when they pass through the separating surface between two transparent media is called .....

c Light can easily transmit through the ..... material.

3 Mention the scientific term:

a Darkened area formed behind an object once light falls on it.

b The light energy that can be seen.

c The materials which you can see objects clearly behind and in full details.

Lesson (1 - 2)

Seeing coloured objects

Objectives

By the end of this lesson, the student should be able to:

- Explain why opaque objects can be seen in different colors.
- Explain why objects can be seen in different colors through the colored transparent objects.
- Identify the primary and secondary colors and lights mixing.

You have learned in the previous lesson that the white visible light can be separated by using a prism into seven colours. These colours are known as «Spectrum colours». What are these colours?.

1 ..... 2 ..... 3 ..... 4 .....

5 ..... 6 ..... 7 .....

- **Materials:** a piece of construction paper - colouring pens - scissors - a protractor.
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Cut the construction paper in a shape of a disk as indicated in the figure below.
  3. Divide the disk into seven equal parts by using the protractor.
  4. Colour each sector using a colour of the visible spectrum with the same order (Fig. 11).
  5. Bore a small hole in the disk centre and let your pencil go through.
  6. Rotate the disk quickly.
- **What do you observe?**
- **What do you infer?**

Fig. (11)
A piece of the construction paper in the shape of a disk is divided into seven sectors Coloured with the spectrum Colours.

Seeing the colour of objects:

Have you ever asked yourself how you can see colours? You see the colours because the white light is composed of the seven colours of spectrum. Bring a glass bottle as that in the next picture (Fig.12), it's a transparent glass container.

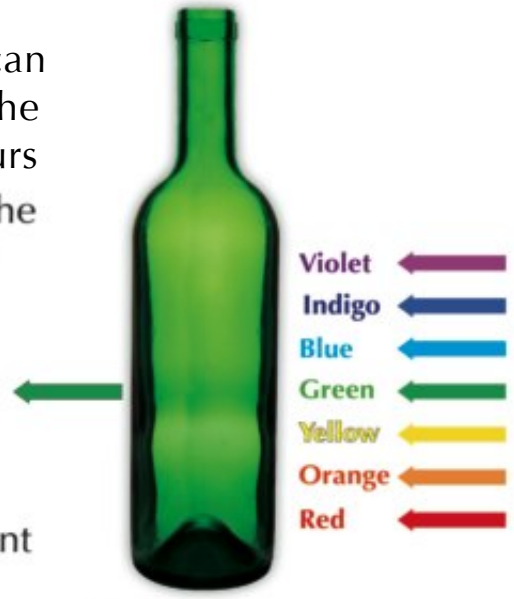


Fig. (12)
Why does the glass container seem to be in green?

- Why does the glass container seem to be green?
- **Read the following to know what happens:** When the white light strikes the transparent glass container as indicated, the glass container absorbs all the light colours except the green one. The green glass transmits the green light through, so the glass container seems to be green.
- **Inferring:** Transparent and translucent objects have the same colours as the light transmitted through.

Now, look at the next picture (Fig.13), it is a banana fruit. What is its colour?.

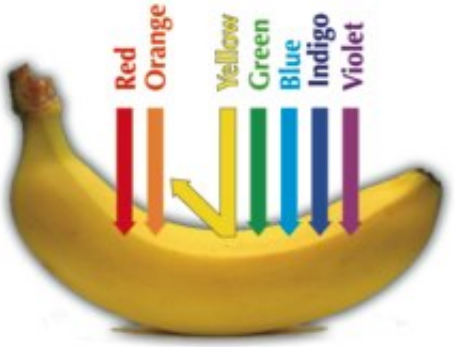


Fig. (13)
Why does the banana fruit seem to be in yellow?

Read the following to know why the banana fruit seems to have such colour. when the white light strikes the banana fruit, it absorbs all the light colours except the yellow one. The banana fruit seems to be yellow because the yellow light is reflected on it.

- **Inferring:** Opaque objects have the same colour of light they reflect (Fig.13). So, why do some objects seem to be white and some others are black?

- White objects reflect all the colours of the white light, but the black ones absorb all the lights that strike them and don't reflect any colour of the light colours.

Activity Watching a coloured object through a transparent coloured object

- **Materials:** a red apple - a red, green and blue glass sheets.
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Look at the red apple through the red glass sheet (Fig. 14). Do you see the apple coloured? white colour is the apple you see?.
  3. Look at the red apple through the green glass sheet. Do you see the apple coloured? If so, what is colour?
  4. Repeat the previous step using the blue glass sheet and record what do you see.

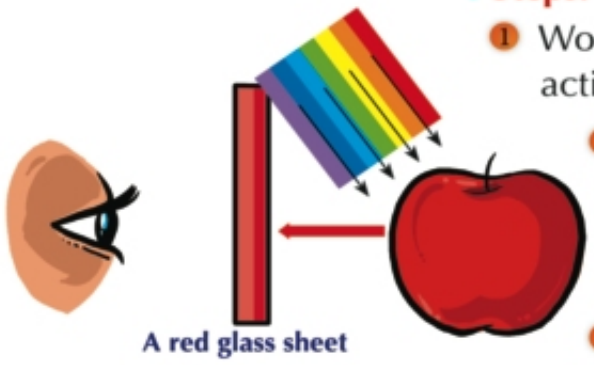


Fig.(14)
Watching a coloured object through a transparent coloured object.

What have you learnt?

- **The red apple is seen red because it absorbs all the colours of light that strike it and reflects the red one only. When the reflected red light bouncing back from the apple it strikes the red glass sheet, the red light transmits through the glass and reaches the eyes so you see the apple in red.**
- **When you look at the red apple through the green glass sheet, you will find that the green glass sheet doesn't transmit the reflected red colour bouncing back from the apple. So, the apple will appear with no colour and seem to be black. You will get the same result in case of using the blue glass sheet, too.**

- **Think!** What colour is a piece of paper stuck by light transmitting through an orange glass sheet?.

Mixing the coloured of lights:

To study the effect of mixing the coloured lights, we use three coloured projector sets: one produces red light, the second produces green light and the third gives blue light.

When the three sets send out the light on a white screen, you will get three circular light spots: red, green and blue as indicated below.

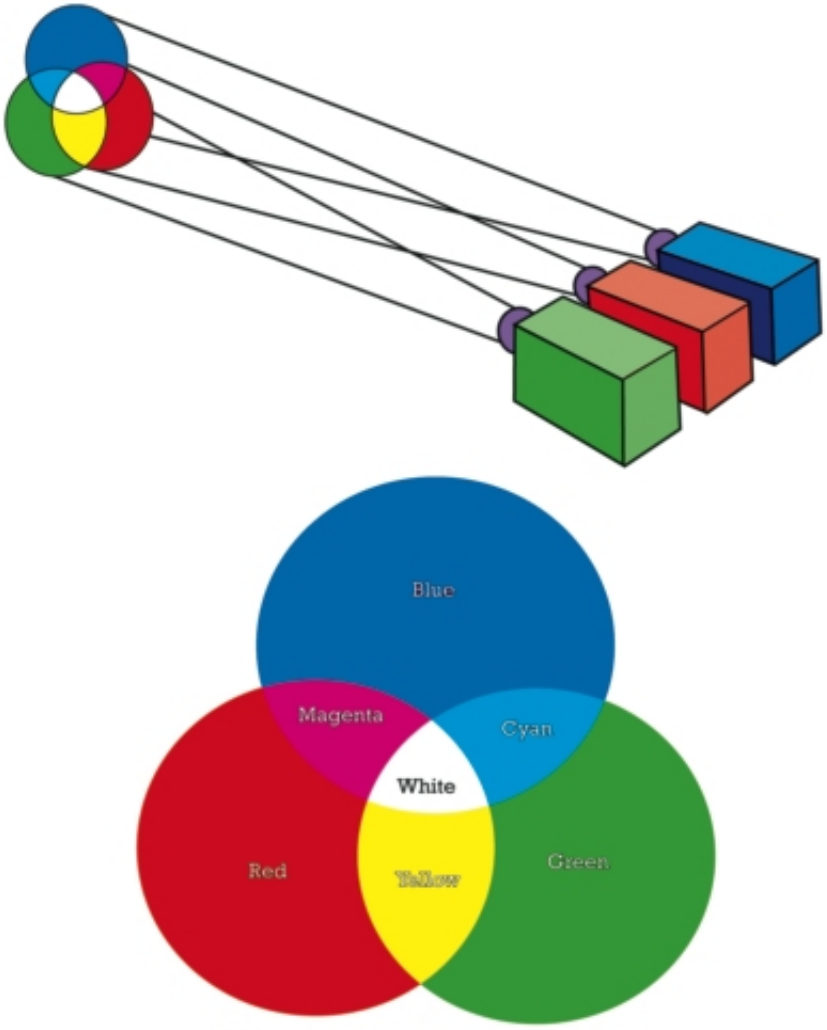


Fig. (15)

Yellow, cyan and magenta light colours are named as "secondary light colours". Observe that we get every secondary light colour by mixing two primary colours.

Did you know?
Mixing coloured dyes gives colours different from the colours resulted by mixing the coloured lights (spectrum colours).

Look at Fig. (15) and observe?

- Mixing the red, green and blue lights results in the giving of white light colour.
- These colours are known as " primary light colours".
- What colour is the area in which green and blue lights are mixed?
- What colour is the area in which red and blue lights are mixed?
- What colour is the area in which red and green lights are mixed?
- Yellow, cyan and magenta colours are known as "secondary light colours". Observe that we get every secondary colour by mixing two primary light colours.

Lesson (1 - 2) Exercises

1 Complete the following sentences:

a The prism separates sunlight into ..... .

b ..... objects have the same colour of light which Transmttid through.

c ..... objects seem having the same colour of light which it reflected .

d If the red light strikes a white ball, it looks in ..... colour.

e Red light + Green light + Blue light = ...

2 Write the scientific term:

a The seven colours of light which sunlight is made up of.

b The colours we get by mixing two colours of the primary light colours.

3 Put (✔) or (✘) and correct the wrong ones:

a When the white light strikes a red rose, it refects the white colour.

b An object seems white since it reflects all the colours which the white light is made up of.

c If you look at a yellow banana through a green glass sheet, it seens black.

d Yellow, magenta and cyan are primary light colours.

e Red, green and blue are primary colours.

Lesson (1 - 3)

Magnetism

Objectives

By the end of this lesson, the student should be able to:

- Identify the natural magnet properties.
- Classify materials into magnetic and non-magnetic materials.
- Deduce practically that the magnet has two poles.
- Identify the magnetic field of a magnet.
- Infer that like magnetic poles repel and dislike ones attract.
- Infer the composition and uses of the compass.

What is the magnet?

2000 years ago, Ancient Greeks found a type of rocks located in an area named Magnesia. This type of rocks has a natural force to attract the materials made of iron.

They named this force the magnetism. The black rock of such type is called the natural magnet.

Nowadays, it is known that the natural magnet is one of the iron ores which is known as magnetite.

Next to that far period man has made different shapes of magnets which are much different in shape and size (Fig. 16).

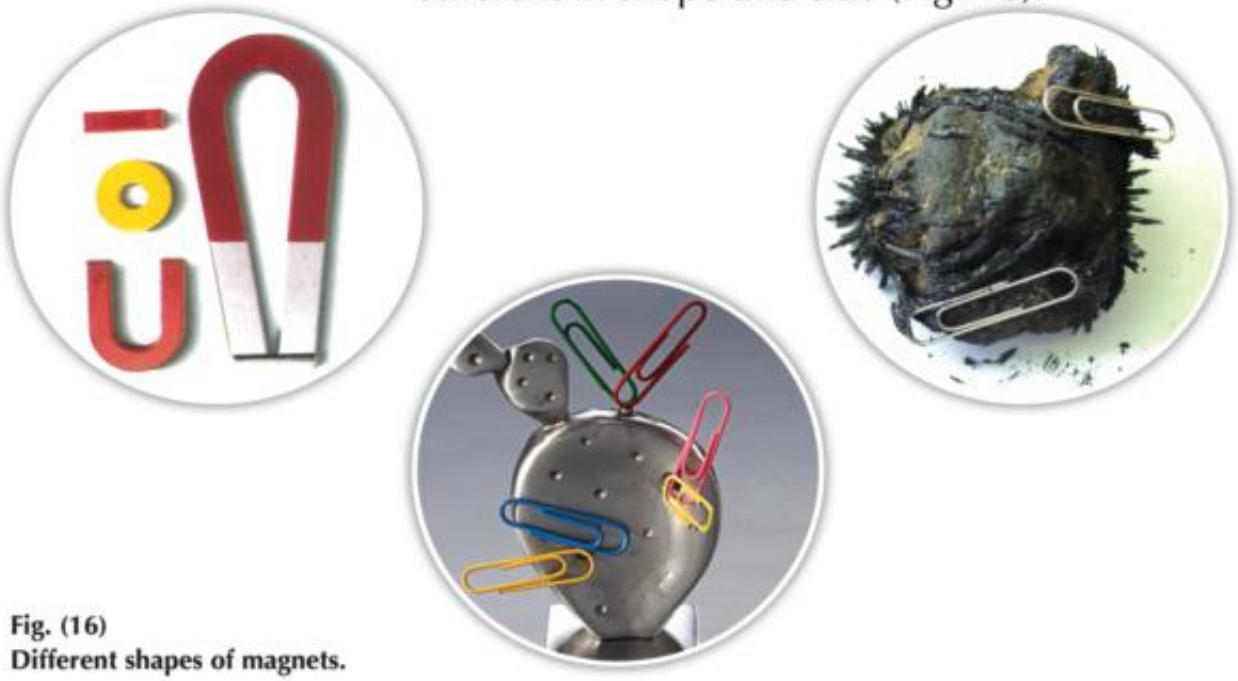


Fig. (16)
Different shapes of magnets.

Classifying materials according to their ability of magnetization:

Activity Magnetic and non-magnetic materials

- **Materials:** A set of different objects such as pins - nails - paper clips - glass - chalk pieces - aluminium - copper.
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Put these objects on a table.
  3. Approach the magnet to each object separately and in order. What do you observe? Do all objects get attracted to the magnet?
  4. Classify the materials which these objects (Fig. 17) are made up of in the following table.

Materials that are attracted to the magnet	Material that are not attracted to the magnet

- **Infer:**
  - The materials that are attracted to the magnet like ....., ..., ... are called «magnetic materials».
  - The materials that are not attracted to the magnet like ....., ... are called «non-magnetic materials».

Fig. (17)
Material may be magnetic or non-magnetic

Think and infer

When you open your refrigerator's door, you pull it back. Why does the door get closed once you move it toward the refrigerator? You observe the small toys sticking on the refrigerator's door, why do such things get stuck on the refrigerator's door?

What have you learnt?

Materials that are attracted to the magnet are magnetic materials and materials that are not attracted to the magnet are non-magnetic materials.

Properties of the magnet

Activity The magnet has two poles

- **Materials:** a bar magnet - metal paper clips.
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Approach the paper clips to the bar magnet as indicated in figure (18) opposite. Which part of the magnet attracts the greater number of the paper clips?

Fig. (18)
Which parts of the magnet attract the greatest number of metal clips?

What have you learnt?
The areas of the magnet which attract a greater number of paper clips are the two ends of the magnet. The magnet's two ends are called «the poles of the magnet». Every magnet has two poles.

- **Infer:** Which area of the magnet does a magnet have the most powerful force of attraction?
- **Infer:** How many poles are there in a magnet? Every magnet has.....

Activity Direction of the free - motion magnet

- **Materials:** a bar magnet - a stand.
- **Steps:**

1. Work with your classmates to conduct this activity.
2. Hold a magnet at its centre by a fine string fixed in the stand. Leave the magnet until it gets horizontally stabilized (Fig.19).
3. Move the magnet to the right or left slightly, then leave it until gets stabilized.
4. Repeat the previous step several times. Observe the direction that the magnet has when it gets stabilized every time you repeat the steps.
5. Does the stabilized magnet always have a fixed direction?

Fig. (19)
Free - motion magnet.

What have you learnet?

When we hold a magnet freely, one of its poles is trying to search for the north direction and refer it. This pole is called the north pole (N). On the other hand, the other end of the magnet searches for the south direction and refers to it. This pole is called the south pole (S).

Activity Magnetic poles properties

- **Materials:** two bar magnets, assigned on them the north and south poles.
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Hang one magnet and make it move freely.

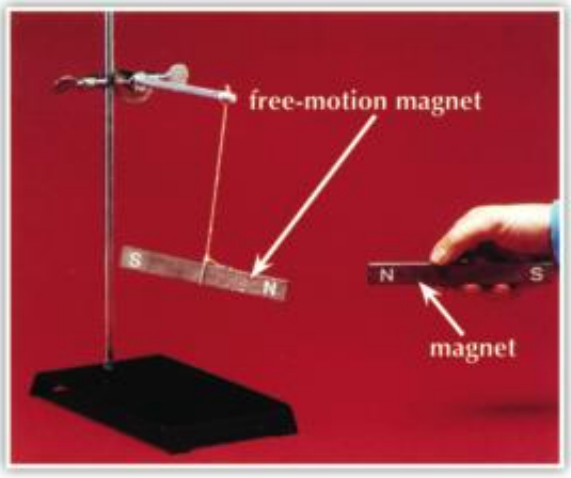


Fig. (20)
The like magnetic poles repel each other, and the unlike ones attract each other

  3. Approach the north pole of the other magnet to the north pole of the hung one (Fig.20). Observe what happens.

- **Infer:** Do the two poles attract or repel?

  4. Repeat the previous step by approaching the two south poles to each other.
  5. Repeat it once more time by approaching a magnet north pole to the hung magnet south pole.

- **Infer:** Do the unlike poles attract or repel?

Magnetic field

Is the space around the magnet in which the effect of magnetic force appears through. Magnetic force is an invisible one, so you can use iron filings to see the magnetic field which is formed by the effect of the magnetic force. Magnetic force is the magnet ability to attract the magnetic materials existed in its field.

Activity Illustration of the magnetic field by using iron filings and a glass sheet

- **Materials:** iron filings - a magnet - a glass sheet
- **Steps:**
  1. Work with your classmates to conduct this activity.
  2. Place the magnet horizontally on a table, then place the glass sheet on it.
  3. Sprinkle some iron filings on. Hit the glass sheet slightly (Fig.21).
- What do you observe? Do the iron filings get arranged around the magnet in a certain way?
- **Inferring:** What is the most area of the magnet in which the iron filings are assembled?
- **Inferring:** Where is the most magnetic force of the magnet?

Fig. (21)
Iron filings get arranged around the magnet in a regular way which determine the shape of the magnetic field of the magnet.

What have you learnt?
The greatest magnetic force of a magnet occurs at its poles.

Compass

Long time ago, Chinese used the magnet rock and found out that if it's hung freely, one of its two ends indicates the north direction. A Chinese major General led his army through a dense fogy area depending on this method.

In 1600, An English doctor named William Gelbert made a magnetized needle. This magnetized needle is a light and small magnet that can spin freely. This magnetized needle is considered the same idea as the magnet rock. The magnetized needle was the basic idea in making the compass.

Fig. (22)
The compass contains a small, light, free moving magnet.

Observe the figure (22), you see a small magnet that can spin freely and its north pole refers to the north geographical direction. Compass is used to identify the four geographic directions.

Activity How can you make a compass?

- **Materials:** a basin containg water, a piece of cork and small light magnet like a magnetic needle.
- **Steps:**
  1. Float the cork piece on water surface.
  2. Insert the magnetic needle in the floating cork piece.
  3. Move the piece of cork, then leave it to stabilize (Fig. 23). What do you observe?
  4. You can observe that the piece of cork turns to be stabilized where the magnetic needle is pointing to the north and south directions.

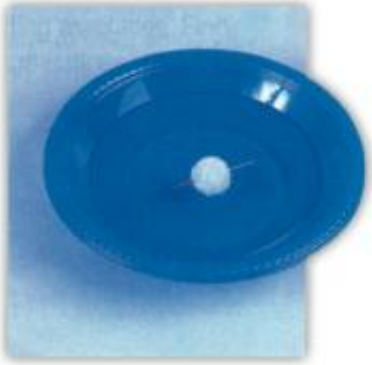


Fig. (23)
A piece of cork, with a magnetic needle, floats on water surface.

Lesson (1 - 3) Exercises

1 Put (✔) or (✘) and correct the wrong ones:

a The natural magnet is one of the iron ores (magnetite).

b A magnet attracts all materials.

c The magnetic field is the space surrounding the magnet where the magnetic force appears.

d Like poles repel and unlike poles attract.

2 Write the scientific term:

a A material gets attracted to the magnet.

b The space around a magnet in which the magnetic force appears through.

c An area of the magnet where the magnetic force is most powerful.

d A tool that is used for locating the main four geographic directions.

e The materials that don't get attracted to the magnet.

3 Complete the following sentences:

a Like poles ..... whereas unlike poles ..... .

b A magnet pole that always refers to the north direction is called .....

Lesson (1 - 4)

Magnetism and electricity

Objectives

By the end of this lesson, the student should be able to:

- Identify the magnetic effect of electric current.
- Use some tools to make an electromagnet.
- Conduct experiments to know the basic idea of how the electric generator (dynamo) functions.

Magnetic effect of the electric current (Electromagnet)

Did you know you can generate a magnetic field by using an electric current. You can realize that by conducting the following activity:

Activity The magnetic field of the electric current

- **Materials:** a small compass - an insulated wire - a small battery.
- **Steps:**

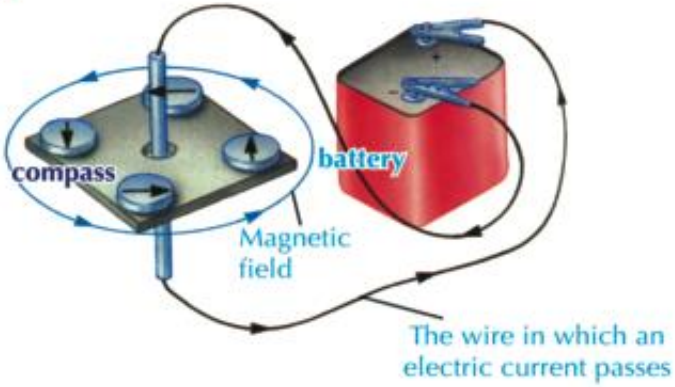


Fig. (24)
The magnetic field of the electric current

1. Put the wire beside the compass. Does the compass needle deflect?
2. Connect the wire ends with the two poles of the battery. Put the compass beside the wire in which an electric current passes (Fig. 24). Does the compass needle deflect?
3. What do you infer from this activity?

What have you learnt?
The electric current has a magnetic effect.

The electromagnet

Activity Magnetism by using electricity

1. Bring a long wrought iron nail and approach it to a set of metal paper clips (or iron filings).
   - Do the clips or iron filings get attracted to the nail?
2. Bring a 30 cm insulated copper wire, then wind it around the nail.
3. Remove 2 cm of the insulated material from the wire's two ends then contact them with the battery's two poles to let the electric current pass through the twisted wire around the nail (Fig. 25).
4. Do the metal clips (or iron filings) get attracted to the nail? (Yes, No).

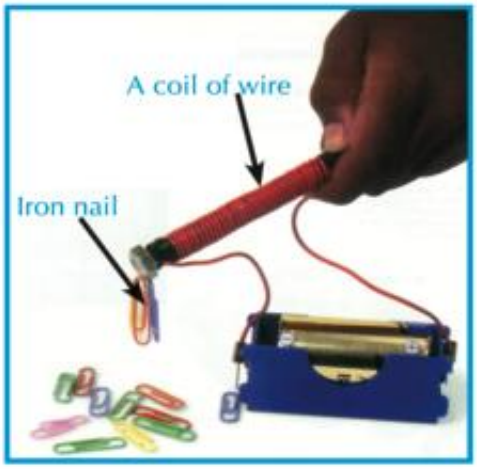


Fig. (25)
The nails attract the metal paper clips.

What have you learnt?

When an electric current passes through a twisted wire in the form of a coil around a wrought iron bar, the wrought iron bar becomes a magnet and is known as «the electromagnet».

The magnetic force of the electromagnet can be increased by increasing the number of coil turns or by increasing the intensity of electric current passing through the coil by using two batteries.

Uses of the electromagnet

Factories use huge electromagnets to move the heavy iron blocks where electromagnet is hung by using a big-sized winch. The winch descends the electromagnet over the iron or steel blocks to lift. The electromagnet attracts the iron or steel blocks (Fig. 26) when an electric current passes through its coil. By cutting the electric current, the electromagnet loses its magnetic force and iron blocks fall. Your house contains many devices that contain a small electromagnet, such as the electric bell, electric mixer, the disc drive and the television.

Fig. (26)
Electromagnet attracts iron pieces. By cutting electric current, it loses its magnetic force and iron pieces fall.

Generating the electric current by using the magnet

In the 19th century, an English scientist called Faraday figured out a great discovery that when we move a magnet inside a coil of wire (Fig. 27), an electric current passes through the twisted wire. Furthermore, when the magnet stops moving, the electric current doesn't pass. Faraday used this discovery to make an electric generator known as «the dynamo». When you move a magnet toward the inside of a coil and toward its outside, an electric current is generated in the twisted wire. This current lightens the light bulb connected between the two ends of the coil.

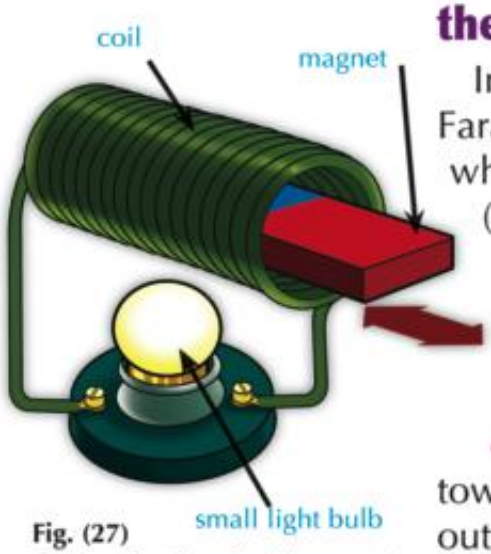


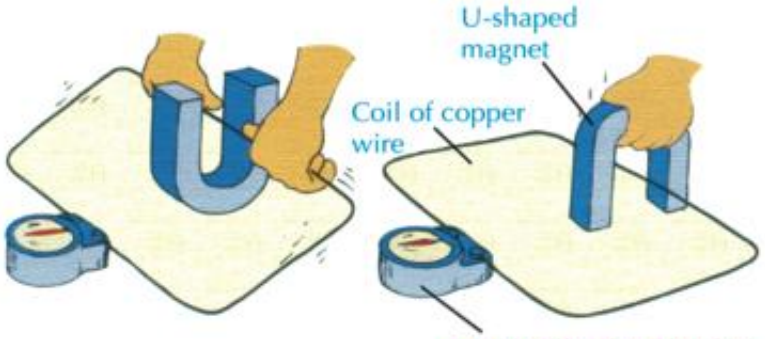
Fig. (27)
Generating the electric current by using a magnet and a coil.

Activity Genetating of is an electric current by using a magnet

- **Materials:** a U-shaped magnet - copper wire's coil - Ammeter.

- **Steps:**

1. Move the wire between the two poles of the magnet up and down (Fig. 28) and observe that the apparatus pointer deflects. This is an evidence of passing an electric current through the wire of the coil when it moves between the magnet's two poles.
2. Does the apparatus pointer move when you stop moving the wire?



An apparatus used to measure the electric current intensity (Ammeter)

Fig. (28)
On moving a wire coil between two magnetic poles or moving a magnet arround the coil, an electric current is generated

- **What do you infer?**

3. Does the movement of the apparatus pointer increase or decrease faster when you move the wire?

What have you learnt?

An electric current can be generated in a wire by moving the wire between the two poles of a magnet or moving the coil in the magnetic field between a magnet's two poles and so it is the basis of «The generator or the dynamo».

Generator (dynamo) changes the mechanical energy into an electric one.

Fig. (29)
The bicycle's dynamo is a small cylinder touches the tire of the bicycle.

Generating electricity:

- You may know that the dynamo is a device used to convert the kinetic energy into electric energy.
- Have you ever observed a dynamo (generator) in a bicycle (Fig. 29)?
- Why does the generator get used in a bicycle?

- The (dynamo) in a bicycle is a small cylinder that touches the bicycle wheel tire. This small cylinder is connected with a u-shaped magnet.
- When the bicycle moves, the cylinder of the generator turns because it touches the bicycle tire and so the magnet turns. As the magnet turns, an electric current is generated in a coil causing the bulb in the bicycle lightening.
- Huge electric generators are used in electric power generating plants. Each electric generator is a dynamo composed of many great coils that turn between the two poles of a huge magnet. Such electric generators are used to generate large amounts of electricity used for lightening the cities.
- There are two ways to increase the amount of electricity produced by such dynamo. The first way is by using a strong magnet and the other one is by increasing the number of turns in the moving coils.

Scientific Background

There are 3 types of electric power stations, which are:

- Wind electric power stations use wind energy to move the dynamo.
- Thermal fuel electric power stations: use the heat produced through burning fuel (oil, coal and natural gas) in heating water to produce steam which is used in moving the dynamo.
- Nuclear electric power stations: use nuclear reactors to produce the heat required for the movement of dynamo.

Lesson (1 - 4) Exercises

1 Choose the correct answer:

a The coil of a dynamo is made up of ..... wire.
1 copper 2 carbon 3 aluminum

b The dynamo generates ..... energy from mechanical energy.
1 thermal 2 electrical 3 light

c The dynamo is fixed in the bicycle .....
1 seat 2 pedal 3 tire

2 Complete the following sentences:

a The basic idea of the electric generator is the changing of ..... into .....

b When you move a coil between two poles of a magnet, ... is generated in the coil.

c The electric current produced by the electric generator (dynamo) increases when ..... or ..... get increased.

d The apparatus that converts kinetic energy into electric energy is called the .....

3 Put (✔) or (✘) and correct the wrong ones:

a The electromagnet consists of an iron bar and a coil.

b The deflection of the ammeter's pointer increases by increasing the speed of motion of the coil.

Evaluate your understanding

- Through such exercise, you can evaluate how much you understand the main concepts in this unit.
- Examine the figures, then answer the following questions.

- How a rainbow is formed?

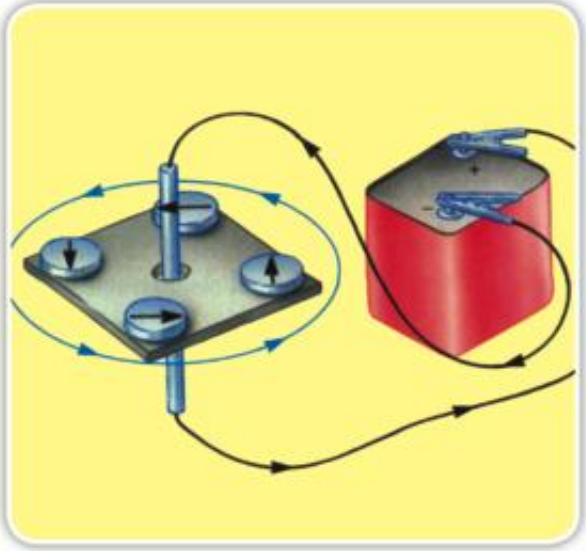
.....

.....

- How you can see the visible light? .....

.....

.....



- How can you practically show the magnetic effect of the electric current? .....

.....

.....

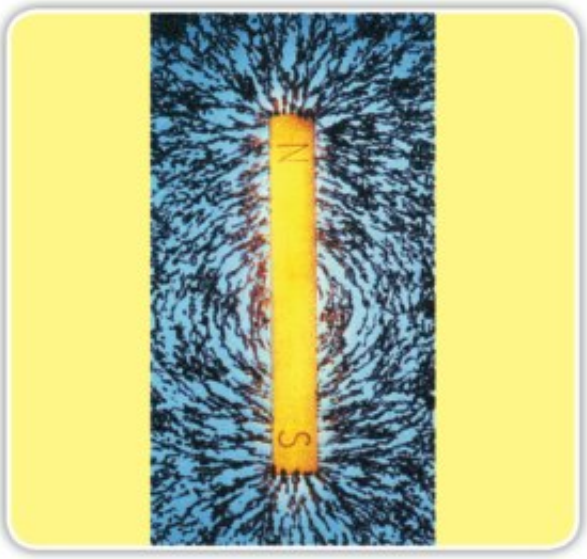
- What are the composition and uses of the compass?

.....

.....

.....

Evaluate your understanding

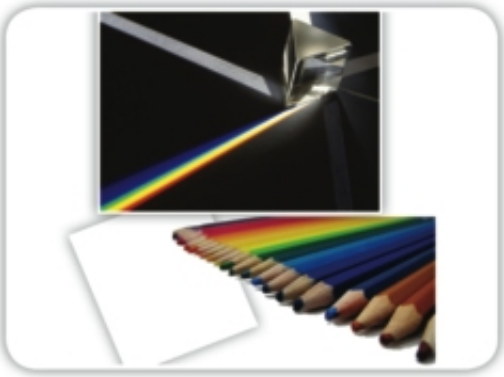


- What is the magnetic field?
  .....
  .....
- What are the effects of the magnetic field? .....
  .....
- Describe an experiment shows the transformation of the magnetic energy into an electric one. .....
  .....
  .....

- What is the composition of the bicycle dynamo? .....
  .....
  .....
- How does the dynamo work? .....
  .....
- Give an experiment shows how does the dynamo work. .....
  .....
  .....

Activities

- During your studying of this unit, you have a set of tasks and activities.

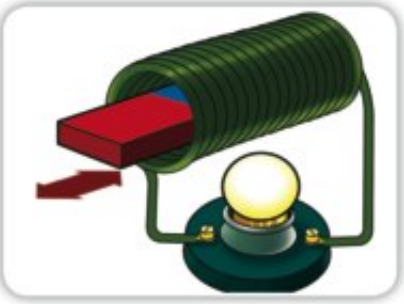


- **1st: Design a school wall bulletin:**
  - Share your classmates under supervision of your teacher to design a school publication concerns the top is of the unit.
  - Use the figures and photos included in the unit to support the topics of the bulletin. The suggesting topics are: light rays refraction and reflection phenomena in our daily life.
- **2nd: Interesting topics:**
  - Use the school library and internet sites to search about some topics related to the unit, as seeing colored objects, magnetic field, electromagnet and its uses, and the compass.
- **3rd: Make models:**
  - Use the available materials in your environment to make models of spectrum colors, rainbow and dynamo.
- **4th: School broadcasting:**
  - Prepare an essay about one of the previous topics or other and present it through the school broadcasting.
- **5th: Field visit:**
  - Share your classmates under supervision of your teacher in visiting a location where huge electromagnets are used.

Activities

- **6th: Rewrite a topic from this unit:**
  - Choose a topic from this unit.
  - Read it again and divide it into paragraphs.
  - Research about this topic in books of school library or through the internet.
  - Rewrite the topic on your own view.
  - Display the topic to your teacher and your classmates.

- **7th: Form a team with your classmates:**
  - Share your classmates to form the science friends team, under supervision of your teacher.
  - Work with your classmates in suggesting the program and activities of the team through the school year.
  - Write a paragraph titled "Rainbow" reasoning why it happens and when.
  - Write a report showing the relation between magnetism and electricity explaining their applications in daily real life .



- **8th: Designing of a poster:**
  - Choose a topic from this unit and work with your classmates under supervision of your teacher to design a poster about this topic.

Unit 1 general exercises

1 Use the following words to complete the sentences below:

poles - repel - attract - unlike - magnetic field - compass - electromagnet - electric geberator - motor - angle of incidence - angle of reflection.

a The ..... has a small light magnet moves freely around a fixed axis.

b The ..... is the space surrounding a magnet in which the magnetic force appears through.

c The magnetic force is most powerful at the ..... of the magnet.

d Like poles ..... each other.

e ..... poles attract.

f When an electric current travels through a wire twisted around an iron nail, the nail becomes an .....

g A set that changes the mechanical energy into electrical one is known as a .....

2 Write the scientific term which expresses each of the following sentences:

a Reflection of light on the surface of white paper in different directions.

b The materials that don't allow light to transmit through and objects can't be seen through.

c The change of light rays directions when they transmit through the separating surface between two different transparent media.

d The seven colours which the white light is made up of.

e Red, green and blue lights.

f Yellow, purple and cyan colours.

g The materials that get attracted to the magnet.

h The two ends of the magnet where the magnetic force is most powerful.

i A set is used to change the mechanical energy to the electric one.

3 Answer the following questions:

a «How can electricity make our life different?» ... Write a paragraph.

b Mention some sets and instruments in which the electromagnet can be used.

4 Put [✓] or [✗] and correct the wrong ones:

a Light is a form of energy.

b A rainbow is formed when the sun separates the moonlight.

c Light transmits in straight lines.

d Transparent objects have the same colour of the light that doesn't travel through.

e Opaque objects have the same colour of the light which the object reflects.

f Cyan, magenta and yellow are the primary colours.

g Mixing red, green and blue colours produces the white colour.

h Aluminium gets attracted to the magnet.

i An electric current can be generated by using a magnet.

j Magnetism is always related with electricity.

k An electromagnet is formed when an electric current passes through a compass.

5 Make a diagram supported with the data or a paragraph to illustrate the following:

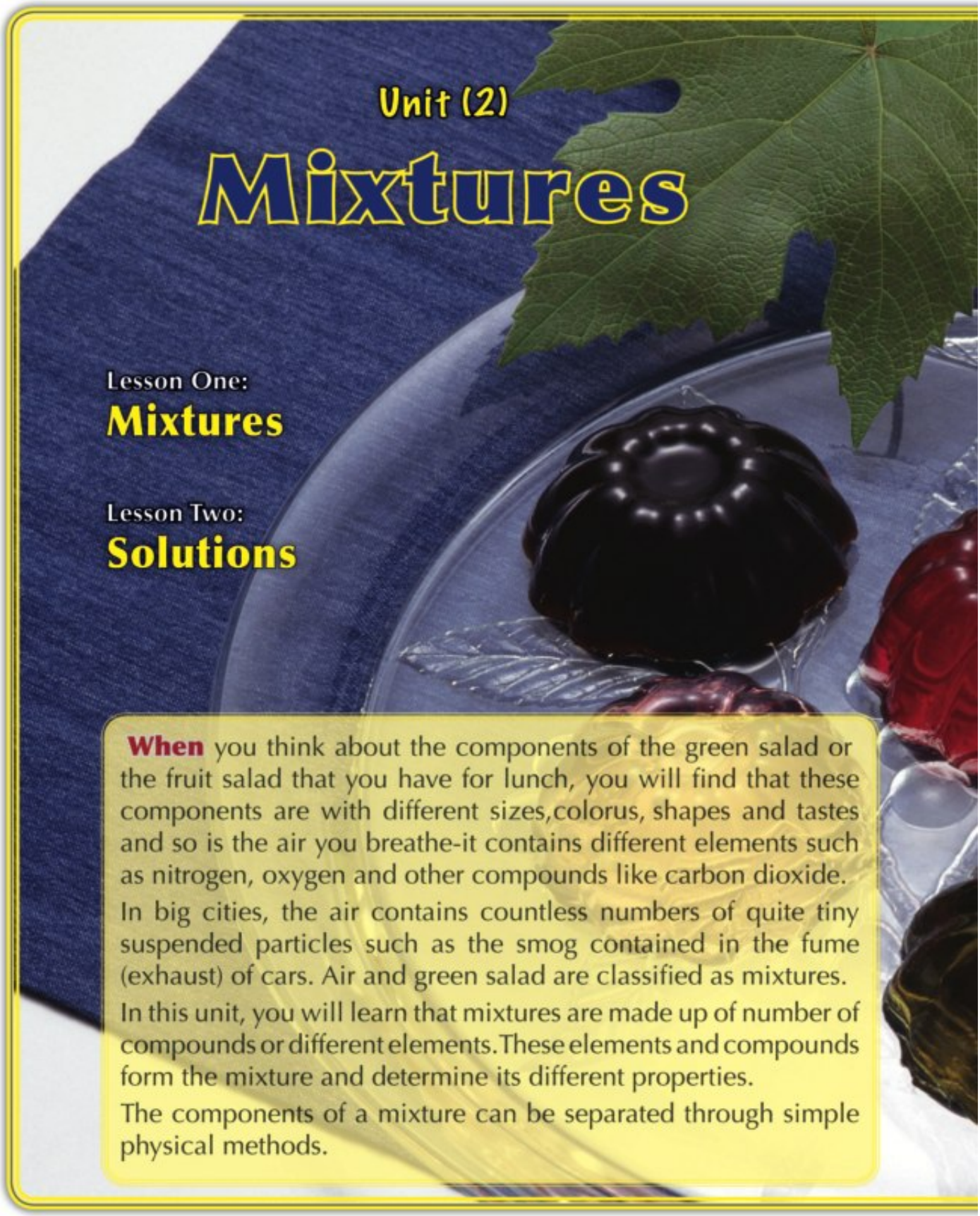
a Hanging a magnet freely.

b Approaching two north poles of two magnets to each other.

c Using a prism to separate the white light.

d Using a coil of wire and an iron nail to make an electromagnet.

e Using a coil of wire and a magnet to generate the electric current.



Unit (2)

Mixtures

Lesson One:
Mixtures

Lesson Two:
Solutions

When you think about the components of the green salad or the fruit salad that you have for lunch, you will find that these components are with different sizes,colorus, shapes and tastes and so is the air you breathe-it contains different elements such as nitrogen, oxygen and other compounds like carbon dioxide.

In big cities, the air contains countless numbers of quite tiny suspended particles such as the smog contained in the fume (exhaust) of cars. Air and green salad are classified as mixtures.

In this unit, you will learn that mixtures are made up of number of compounds or different elements. These elements and compounds form the mixture and determine its different properties.

The components of a mixture can be separated through simple physical methods.

Unit Objectives

By the end of this unit, the student should be able to:

- Conclude the concept of a mixture.
- List some examples of mixtures.
- Distinguish between different types of mixtures.
- Cooperate with his classmates.
- Recognize the concept of solubility process.
- List examples of solvents and solutes in some solutions.
- Distinguish practically between the solubility of materials.
- Perform experiments to investigates factors affecting solubility.

Lesson (2 - 1)

Mixtures

Objectives

By the end of this lesson, the student should be able to:

- Conclude the concept of a mixture.
- List some examples of mixtures.
- Distinguish between different types of mixtures
- Cooperate with his classmates.

Classification of Matter:

You have learned about nature of matter & its properties. We can organize substances into two basic categories. They are: Pure substances & mixtures.

- **Pure substances:** are made only of one type of identical particles, such as distilled water, sugar & baking soda.
- **A mixture** contains more than one type of particles. In some mixtures, you can see the different types because similar particles stay clumped together.

For example, you can see the different substances that make up concrete, milk and tomato sauce.

Fig. (30) The components of some mixtures as : concrete, milk, & tomato sauce can not be seen

How can matter be mixed?

When you help your family make lunch. As you cook, you are mixing different kinds of matter.

What would you put in a salad? You might put in some lettuce, carrots, tomatoes ...etc. (Fig.31). When you mix the components of the salad, you are mixing solids together.

How could you make a dressing for the salad? You might mix oil and vinegar together. Then, you are mixing liquids.

Fig. (31)
Green salad

When you prepare a fruit salad, you will mix some fruits together like banana, orange, and strawberry (Fig. 32).

These fruits do not join together. Each kind has its properties. Each piece remains as it is after mixing.

Also, you can put the substances together in any amounts.

You can add or remove any pieces as you like. Your fruit salad will still be a mixture.

Fig. (32)
Fruit salad.

Fig. (33)
Vegetable soup.

- **Look at the picture & write out:**
  - Vegetable soup (Fig. 33)is a mixture that consists of:
  - ....., ..., and .....
  - The concept of the mixture as you understand it: .....
  - Properties of a mixture: .....
- Look around you, what things do you see that are mixed together?
- **Think and record:**
  - Is there any taste change of any component after mixing?
  - Is it possible to separate any salad component after mixing?

Fig. (34)
How can you form a mixture of these substances?

Activity Mixing Things

- **Materials:** Flask with lid - water - oil - vinegar - sand - salt.
- **Steps:**

1 Put some water in the flask.
2 Add one of the solids (as salt).
3 Put the lid on the flask and shake gently.
4 Put the flask down and observe.
5 Wait a minute and observe again.
6 Record your results in the table below.
7 Add one of the liquids (as oil).
8 Repeat the activity by using water, vinegar and sand.

9 Repeat the activity with different materials & record your results in a table in each one.

	1st Trial	2nd Trial	3rd Trial	4th Trial
Mixture components				
Observation after shaking				
Observation after 1 minute				
Conclusion				

Everyday Life Applications

Air:

Air is a mixture of gases such as oxygen, nitrogen, carbon dioxide & water vapour.

Mineral water:

Mineral water is a mixture of water and minerals such as calcium and magnesium.

How mixtures formed?

Mixtures can be formed by shaking, grinding or stirring.

Salt & pepper	Salt & water
Salt & pepper can be mixed by shaking or grinding	Salt & water can be mixed by shaking or stirring
Solid materials can be mixed by shaking or grinding.	Solid & liquid materials can be mixed by shaking or stirring.

Banana & Strawberry
Banana & Strawberry juice can be mixed by shaking or stirring
Liquid materials can be mixed by shaking or stirring.

Fig. (35)
How mixtures formed?

How can matter be separated?

As we know in our daily life, magnet attracts some materials such as paper clips, some pins and anything containing iron.

- **Q:** Is it possible to separate some components of a mixture using a magnet?

Activity Separation of mixture formed of solids

- **Materials:** iron filings - some sand – magnet -
- **Steps:**

1 Mix some sand with an amount of iron filings (Fig. 36).

2 Use gloves during preparation of this mixture.

3 How it is possible to separate iron filings from the mixture?

- **Record your conclusion.**

4 Think and conclude: If you have a mixture of sand, iron filings and some marble how can you separate each component alone?

Fig. (36)
It is possible to separate iron filings from the mixture using magnetic attraction.

Activity Separation of solid-liquid mixture

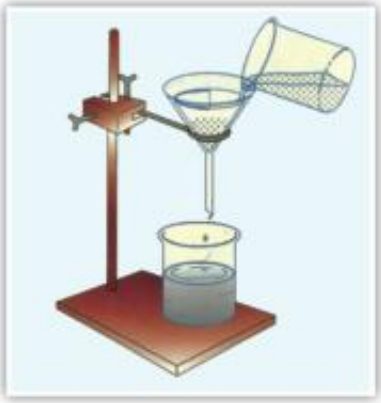


Fig. (37)
Sand can be separated by filtration.

- **Materials:** salt - sand - water - a funnel - filter paper - 2 beakers - a heater - a stand.
- **Steps:**
  1. Make a mixture of salt, sand and water in a beaker, and stir.
  2. Put the filter paper inside the funnel and fix it to a stand, then place a beaker under the funnel (Fig. 37).
  3. Pour the contents of the first beaker into the funnel.
  4. What do you observe? What do you infer?
  5. Boil the filtrate (salt solution) gently. What do you observe? What do you infer?
- Of the previous activity, you can conclude that.
- Stirring is used in making the solution.
- Evaporation is used to separate the soluble solid materials in the solution (Fig. 38).

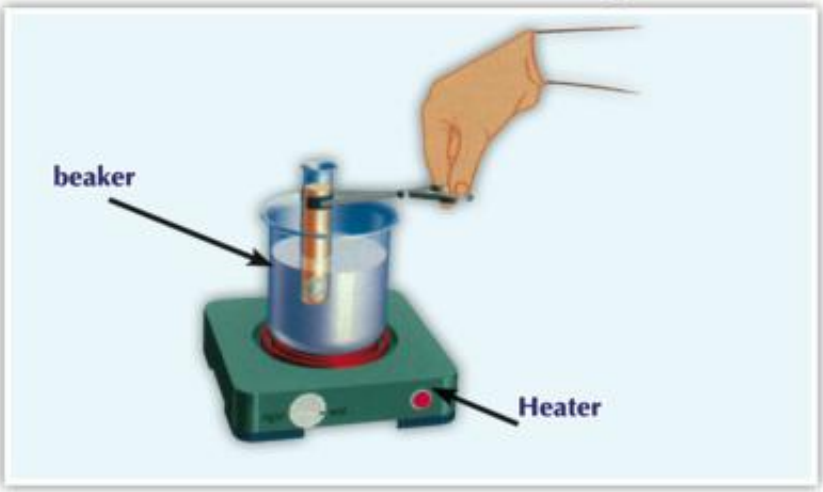


Fig. (38)
Evaporation of water by heating and the salt remains inside the beaker.

Activity How can the components of water-oil solution be separated?

- **Materials:** a separating funnel - a beaker - water - oil.
- **Steps:**
  1. Put some water and some oil in a separating funnel (Fig.39), and shake well.
  2. By using the separating funnel tap, try to separate the water in a beaker and leave the oil inside the separating funnel.
- **What do you infer?**

Of the previous activities, mixture can be separated by one the following ways:

1. Magnetic attraction.
2. Filtration
3. Evaporation.
4. Using the separating funnel.

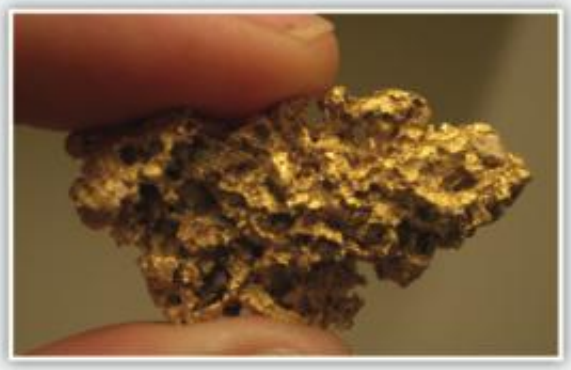
Fig. (39)
Using separating funnel helps in the separation of heterogeneous liquid mixtures.

Enrichment

Alloys:

When mixing different metals with each other by fusion then cooling, homogenous mixtures are produced. These mixtures are used in industry and are known as the alloys.

Gold is considered to be an example of such alloys. Pure gold contains 24 carats of raw gold which is very soft and hard to shape. Gold alloys are composed of gold ore mixed with other components such as zinc and silver in different proportions to be more stronger and easily shaped.



Everyday Application

Table salt collection:

Table salt is collected by evaporating sea water in special places called salt pans.

Lesson (2 - 1) Exercises

1. **Define the concept of the mixture. What are its types? What is the difference between the mixture and the solution?**

2. **Name some mixtures and identify the type of each in a table.**

3. **Mention the ways of mixtures separation. When can each way be used?**

4. **Put (✓) or (✘) and correct the wrong ones:**
   - a. Vegetable salad is considered to be a homogeneous mixture.
   - b. Evaporation and filtration are ways of mixtures separation.
   - c. We use evaporation process in our daily life to separate coffee from water.
   - d. Solubility, filtration and evaporation are ways of mixtures separation.
   - e. A separating funnel is used to separate heterogeneous liquid mixtures.
   - f. Filtration process is used to separate mixtures which have deposits.

5. **Write the scientific term:**
   - a. Mixing several types of fruit juices together.
   - b. Dissolving of carbon dioxide gas in a sugary solution.
   - c. Leaving some sea water exposed to the sun for many days.
   - d. Heating a salty solution gently.

6. **How can the following mixtures be separated:**

   Sand solution - paper clips and flour - water and oil solution - chalk and water solution - sugar solution.

Lesson (2 - 2)

Solutions

Objectives

By the end of this lesson, the student should be able to:

- Recognize the concept of solubility process.
- List examples of solvents and solutes in some solutions.
- Distinguish practically between the solubility of materials.
- Perform experiments to investigate factors affecting solubility.

Apple juice, orange juice, tea, liquid cleaners & liquid soap etc. are all solutions (Fig. 40). A solution is made when two or more substances mix to form a mixture.

There are two types of mixtures they are: homogeneous (such as: salty or sugary solutions) or heterogeneous (such as: mud in water).

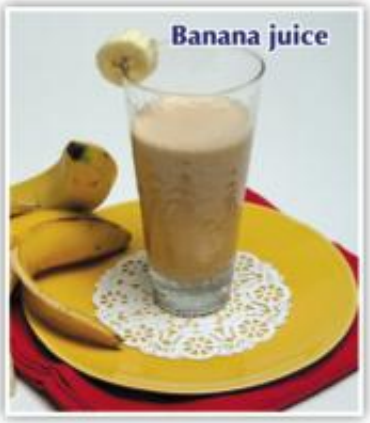


Fig. (40)
Two solutions.

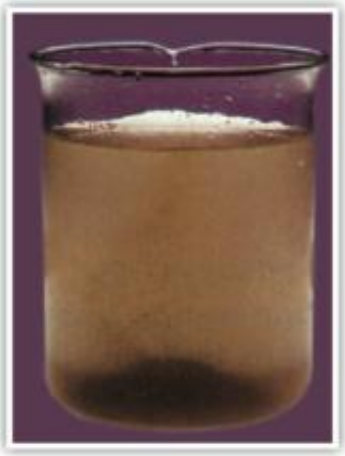


Fig. (41)
Mud doesn't dissolve in water.

Solubility:

In case of forming a solution you should use a solvent (water, alcohol, benzene ...etc.) and solute (matter dissolves in the solvent).

Solubility describes how easily a solute dissolves in a solvent to make a solution. When a substance dissolves in a solvent; we say that it is soluble. If a substance does not dissolve in a solvent, it is said to be insoluble (Fig. 41).

Activity Dissolving process (solution formation)

- **Steps:**

1 Put a small amount of water in a beaker.

2 Add a small amount of salt to it.

3 Stir and then observe the solution (Fig. 42).

4 Record your conclusion.

In this activity, salt is the solute; water is the solvent and stirring is the process needed to dissolve salt. We can express the solubility process as follows:

Solute + Solvent $\xrightarrow{\text{Solubility process}}$ **Solution**

- **Exercise:** Try with your classmates to recognize three well-known solutions and how they are prepared. Write down the solute & the solvent in each case.

Serial	Solutions	Solute	Solvent
1			
2			
3			

Fig. (42)
Salty solution formation.

Terms

- Solvent: is the substance in which the solute disperses, or dissolves.
- Solute: is the substance which dissolves in a solvent.
- Solution: is a mixture in which the solute breaks down into its most basic particles and spread evenly throughout the solvent.
- Solubility: is the process by which a solute dissolves in a solvent leading to the disappearance of the solute.
- Suspended solution: is a mixture in which some particles of the solute are suspended throughout the solvent.

Water: A common solvent

When salt dissolves in water, it forms a salty solution. Also, when sugar dissolves in water, it forms a sugary solution. Thousands of substances dissolve in water and some substances do not dissolve in water; therefore water is called a common solvent.

Factors affecting the solubilty process:

Activity Quantity of solvent & solute

- **Materials:** glass rod – 2 beakers – a quantity of water - a quantity of sugar - stop watch.
- **Steps:**

1 Cooperate with your classmates in performing the activity and recording the results.

2 Use the illustrated tools to make two solutions.

3 Use a glass rod in stirring solutions.

4 Compare dissolving time in both cases (Fig. 43).

5 Compare your own results with the results of your classmates.

6 What can you conclude?

Did you know?

Surface area of solid material affects the solubility

If you have a sugar cube & the same amount of sugar fragmented into small pieces, which one dissolves faster in 100 cc of water? Why?

When breaking the solid material into small parts, it will dissolve in water faster than one whole piece because the cracking gives a larger surface area exposed to the solvent, which makes its solubility faster.

Fig. (43)
Increasing quantity of solvent decreases dissolving time.

Activity

Temperature

- **Materials:** glass rod – 2 beakers – a quantity of water – a quantity of sugar – heater – stop watch.
- **Steps:**
  1. Cooperate with your classmates to conduct the activity and record the results.
  2. Put the same amount of sugar in two beakers containing the same amount of water.
  3. Heat one of them and leave the other without heating.
  4. Calculate & compare dissolving time in both cases (fig. 44).
  5. What can you conclude?

Integrate

Life science

Your blood is a mixture made up of elements and compounds. It contains white blood cells, red blood cells, water, and a number of dissolved substances. The different parts of blood can be separated and used by doctors in different ways. The proportions of the substances in your blood change daily, but the mixture does not change its identity.

Fig. (44)
Increasing temperature reduces dissolving time when using the same amount of solvent & solute.

Activity

Stirring

- **Materials:** glass rod – 2 beakers – a quantity of water – a quantity of sugar – stop watch – heater.
- **Steps:**
  1. Cooperate with your classmates in performing the activity and recording the results.
  2. Use the illustrated tools to make two solutions.
  3. Use a glass rod in stirring only one of them and leave the other till the sugar dissolves without stirring.
  4. Calculate & compare dissolving time in both cases (Fig. 45).
  5. What can you conclude?

Fig. (45)
Stirring increases solubility speed.

Activity The kind of the solute

- **Materials:** 2 glass rods – 2 beakers – a quantity of sodium chloride – same quantity of sodium carbonate – stop watch – 2 heaters
- **Steps:**
  1. Cooperate with your classmates in performing the activity and recording the results.
  2. Use the illustrated tools to make two solutions.
  3. Put amount of sodium chloride in one beaker and same amount of sodium carbonate in the other beaker contains water.
  4. Heat both of them at the same temperature.
  5. Use a glass rod while stirring both of them.
  6. Compare in both cases the dissolving time at the same temperature (Fig. 46).
- What can you conclude?

Fig. (46)
Dissolving time depends on the kind of solute

Conclusion:

You can conclude from the previous activities that the factors affecting the dissolving process are:

1. Quantity of solvent & solute.
2. Temperature.
3. Stirring.
4. The kind of the solute.

Everyday Applications

How Soap works?

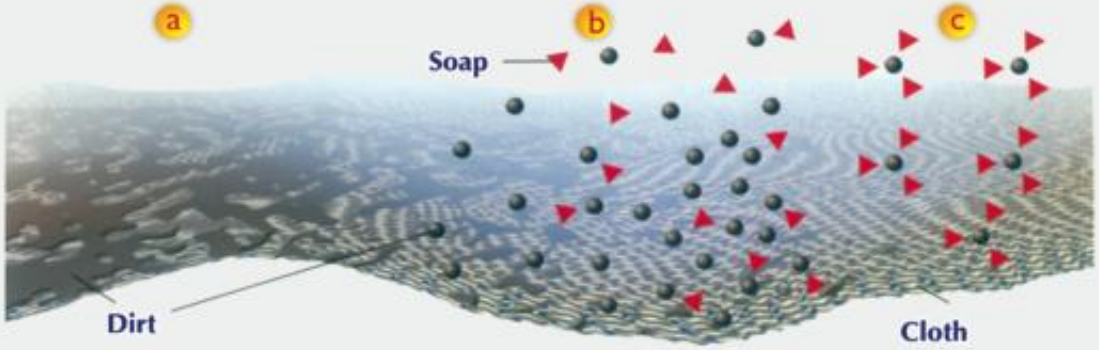
While you are eating a hamburger, a glob of grease and mustard lands on your pants. How can you get the stain out?

For centuries, people have used soap for such tasks. Soap was originally made from fat mixed with ashes from burned wood. When mixed together, these two substances from a new substance that can dissolve oils, dirt, and other substances. Although today's soaps are manufactures from purified chemicals, they work the same way. Soap dissolve in water to form a cleaning solution. While grease and mustard are not soluble in water, they are soluble in a soap solution. The soap solution dissolves grease and other stains, so then be rinsed away with the wash water.

a. The clothes are agitated to loosen the dirt.

b. A soap solution dissolves the loosened dirt and any dirt that is still on the fabric.

c. The dirt and soap solution are then washed away.



In a washing machine, the agitation and soap solution work together to get clothes clean.

Lesson (2 - 2) Exercises

1. **Determine the concept of dissolving process and mention its elements?**

2. **What are the factors affecting dissolving.**

3. **What is the difference between a mixture & a solution?**

4. **Explain how you can distinguish materials in terms of dissolvability.**

5. **Complete the following statements:**
   - a Mixing a small amount of mud with water forming ..... solution that can be separated by .....
   - b Increasing the quantity of solvent ..... solubility time when using the same amount of solvent & solute.
   - c Increasing ..... reduces solubility time.
   - d Increasing temperature ..... solubility time when using the same amount of solvent & solute.
   - e ..... is considered to be a general solvent because of its ability of dissolving most materials.

Evaluate your understanding

- Through such exercise, you can evaluate how much you understand the main concepts in this unit.
- Examine the figures, then answer the following questions.

- What is the type of mixtures that be separated in the figure? .....
.....
- What is the tool used in separating of this mixture?
.....
.....
.....

- What is the type of mixtures shown in the figure? .....
.....
.....
- Does the mixing process affect on the properties of the mixture components?
.....
.....
.....

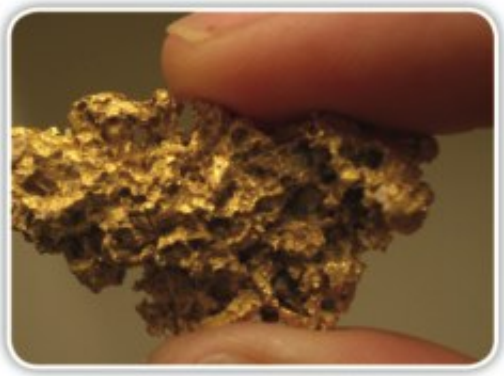
Evaluate your understanding

- Is that shown in the figure an mixture or a pure substance? .....
- Why we use gold alloys in making jewelry? .....
- Give some everyday applications in which we use the alloys. .....

- What is shown by this figure? .....
- Why we use the separating funnel in separating of some types of mixtures? .....
- What are the substances that can be separated by the separating funnel? .....

Activities

- During your studying of this unit, you have a set of tasks and activities.



- **1st: Design a school bulletin:**
  - Share your classmates under supervision of your teacher to design a school publication concerns the top is of the unit.
  - Use the figures and photos included in the unit to support the topics of the bulletin. The suggesting topics are: types of mixtures and solutions, mixtures separation and importance of alloys in our daily life.
- **2nd: Interesting topics:**
  - Use the school library and internet sites to search about some topics related to the unit, such as mixtures in different fields of our daily life.
  - **3rd: Make models:**
  - Use the available materials in your environment to make models of mixtures used in our everyday life.
- **4th: School broadcasting:**
  - Prepare an essay about one of the previous topics or other and present it thought the school broadcasting.

Activities

- **5th: Field visit:**
  - Share your classmates under supervision of your teacher in visiting a factory of alloys.
- **6th: Rewrite a topic from this unit:**
  - Choose a topic from this unit.
  - Read it again and divide it into paragraphs.
  - Research about this topic in books of school library or through the internet.
  - Rewrite the topic on your own view.
  - Display the topic to your teacher and your classmates.
- **7th: The team activities:**
  - Work with your classmates in writing a paragraph about mixtures and their daily life applications, then add it to the school publication.
- **8th: Designing of a poster:**
  - Choose a topic from this unit and work with your classmates under supervision of your teacher to design a poster about this topic.

Unit 2 general exercises

1. **Explain the following concepts: the mixture - the solution - solubility.**

2. **Mention 3 mixtures.**

3. **Correct the following statements by changing the underlined words if they are incorrect:**
   a. The components of mixtures can be separated.
   b. Solubility decreases by shaking and rising the temperature.
   c. The solubility speed of solids increases by grinding.
   d. Increasing the amount of the solvent decreases the speed of solubility.
   e. Mixtures can be separated by the magnetic attraction, filtration and evaporation.
   f. Separating funnel is used to separate the heterogeneous liquid mixture.

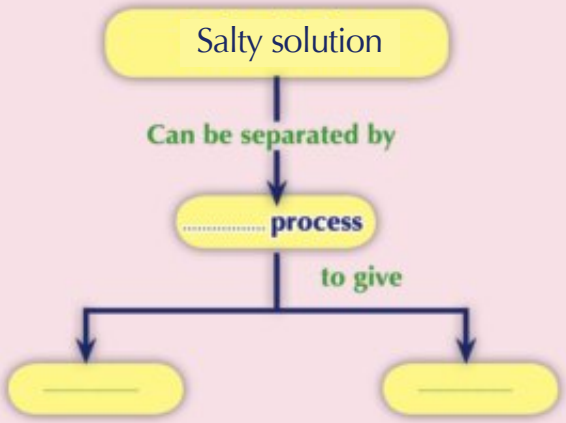
4. **Which of the following processes takes place faster and why?**
   a. Evaporation of an amount of sea water by leaving it in a beaker for several days or heating the same amount on the burner.
   b. Grinding of solids before adding them to a liquid to dissolve or breaking them down into small pieces.
   c. Dissolving of sugar grains and cubes in water.
   d. Dissolving of an amount of salt in a beaker containing 100 ml of water or the same amount of salt in 300 ml of water.

5. **State the solvent and solute in each of:**
   a. Sugary solution.
   b. Salty solution.

6 Show how can the following mixtures be separated:

water contains mud - water contains sand - salty solution - sugary solution.

7 Complete the following concept map.



Unit (3)

Environmental balance

Lesson One:

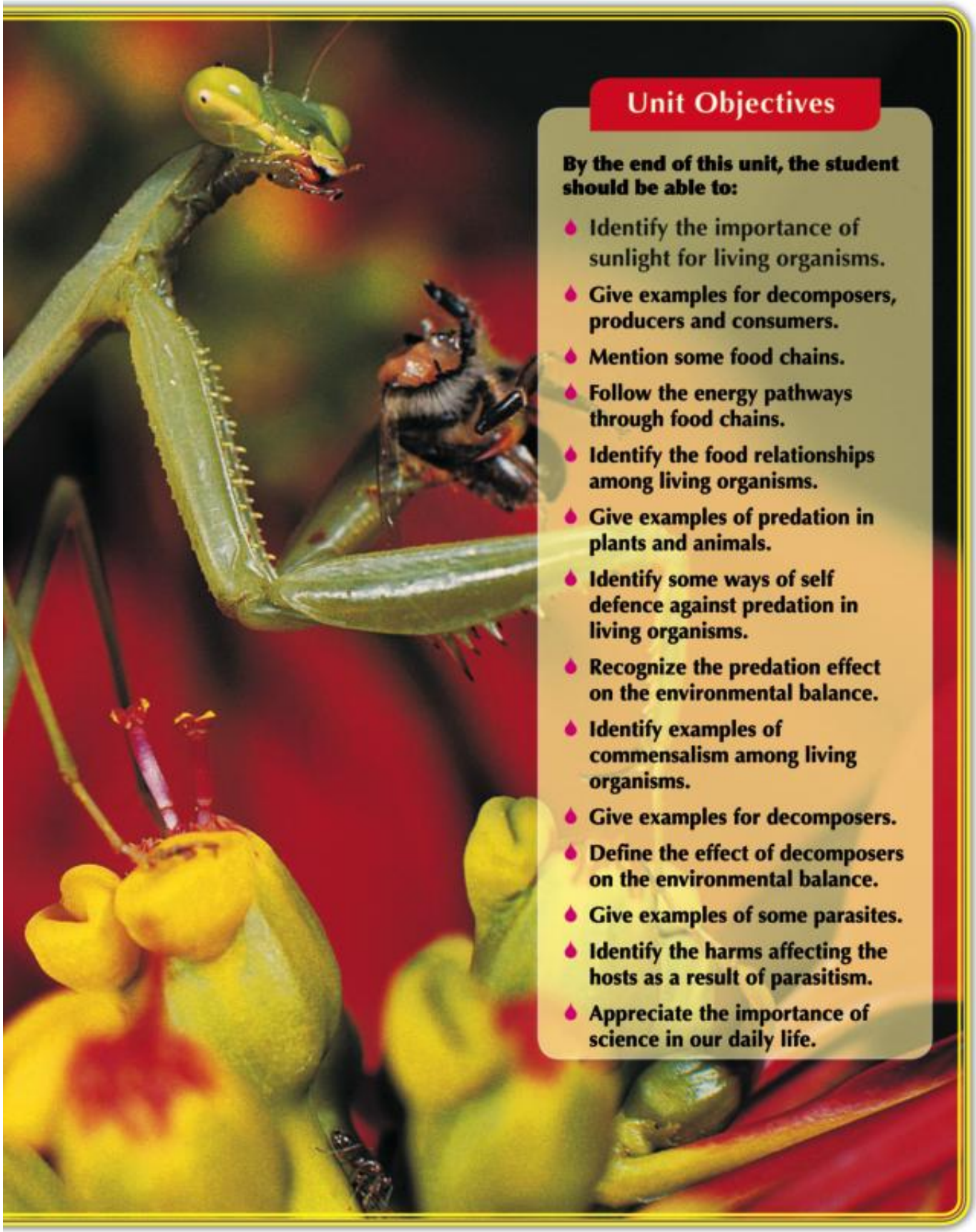
Food relationships among living organisms

Lesson Two:

Environmental balance

Since food is the main source for energy, the problem of getting it is considered one of the main problems all living organisms face. As you know that many types of living organisms compete with each other to get their food using defensive and offensive weapons and the proper adaptations and mimicry.

Interaction among the components of the environment is a continuous process leads to the environmental balance, so the environment keeps balanced unless affected by external circumstances such as the natural crises or the human interference. These circumstances lead to the environmental unbalance.



Unit Objectives

By the end of this unit, the student should be able to:

- Identify the importance of sunlight for living organisms.
- Give examples for decomposers, producers and consumers.
- Mention some food chains.
- Follow the energy pathways through food chains.
- Identify the food relationships among living organisms.
- Give examples of predation in plants and animals.
- Identify some ways of self defence against predation in living organisms.
- Recognize the predation effect on the environmental balance.
- Identify examples of commensalism among living organisms.
- Give examples for decomposers.
- Define the effect of decomposers on the environmental balance.
- Give examples of some parasites.
- Identify the harms affecting the hosts as a result of parasitism.
- Appreciate the importance of science in our daily life.

Lesson (3 - 1)

Food relationships among living organisms

Objectives

By the end of this lesson, the student should be able to:

- Identify food relationships among living organisms.
- Mention some examples of predation relationship.
- Identify ways of defence against predators.
- Identify commensalism relationship among living organisms.
- Identify Saprophytism among living organisms.
- Identify harms of parasitism relationship.

Green plants have the ability to benefit from sunlight as a source of energy in a way that they produce their food from simple substances.

Animals depend on plants to feed (to get energy) in a direct or an indirect way. Among several types of food relationships between living organisms are:

1. **Predation.**
2. **Symbiosis.**
3. **Saprophytism.**

Fig. (47)
There are many types of food relationships among living organisms, such as predation.

1 Predation

In this food relationship, animals get their food by attacking, killing and devouring other living organisms (fig. 48). The animal which devours other animal is known as the predator whereas the other devoured animal is known as a prey.

Fig. (48)
Predators get their food by attacking, killing and devouring other organisms.

- Of these predator animals are lions, tigers, wolves, and sharks.
- What are other animals you consider as predator animals?
- Predation is a temporary relationship which ends up by devouring the prey or a part of it.

Predation is less common in the plant world than in animal world. Plants are autotrophic (self feeders) organisms.

Fig. (49)
How do the leaves of this insectivorous plant hunt the food?

Although some plants perform the process of photosynthesis to make carbohydrate substances, they cannot absorb other compounds from the soil to make their protein.

Therefore, they have to prey some other tiny animals such as insects (fig.49) to get their required elements for making protein. These plants are known as insect eaters (insectivorous plants) such as: drosera and dieonia plants.

Terms

- Predation: Is a food relationship among living organisms in which one living organism devours another one.

Fig. (50)
A butterfly stands on a tree with the similar colour.

Fig. (51)
some frog can change its colour to be hidden from its enemies.

Fig. (52)
Chameleon simulate the color of the Surrounding environment.

Fig. (53)
Cuttlefish ejects a black colored fluid in the surrounding water to hid from the enemies

Some ways of self-defence against predation in living organisms

Many living organisms appeal to ways of defending themselves against enemies. Examples of such ways are:

- **Camouflage:**
  - Observe the figure (50), do you see the butterfly clearly?
  - How does butterfly seems?
  - What is the benefit of this to the butterfly?
  - How do the chameleon and frog (figure 51 and 52) get protection?
  - In the camouflage phenomenon, a living organism can change its color to simulate the colors of the environment where it lives. By this way it can hide from its enemies.
  - This phenomenon is found in most insects as butterflies, fish, frogs, as well as birds.
  - **Explain:** Cuttlefish (sepia) (fig. 53) ejects a black color fluid in the surrounding water when attacked by its enemies.

- **Mimicry:**
  - In this phenomenon other harmless living organisms imitate other kinds of harmful or poisonous living organisms, such as some bees which look like wasps in forming lines on their bodies.
  - Thus, they can escape from enemies which feed on and fear from wasp (fig.54).
  - Write other examples you read about this phenomenon.

Fig. (54)
Stripes on the body of wasps represent a way to frighten enemies and a way of escape.

2 Symbiosis

It is a Common relationship between two different types of living organisms. One of them benefits from the other and does not harm it (commensalism) while the other may benefit (mutualism) or is harmed (parasitism). There are three types of symbiosis.

a Mutualism:

In this relationship both organisms gets benefit from the other and is not harmed.

Mutualism relationship between nodular bacteria and lugemenous plants such as beans (fig.55) Each gets the benefit. Bacteria fix nitrogen in an inorganic form to provide plant with, meanwhile, bacteria benefits form sugars made by plants in photosynthesis.

Fig. (55):Nodular bacteria.

- Insects feed on the nectar of flowers (fig.56) and help plants to transfer pollen grains from one flower to another to accomplish pollination.

Fig. (56): A bee feeds on a flower's nectar

Did you know?

The mutual benefits

Several kinds of bacteria coexist with man. Some live on his skin and work on increasing the immunity of skin against diseases infection. Some others live inside man's intestines and change some food remains into vitamin B. In both previous cases bacteria gets shelter and food from man's body.

- The relationship between a certain type of protozoa and termites is mutualism.
- These protozoa live in their intestines to feed and digest the cellulose of wood.

b Commensalism

- It is the superficial relationship between two living organisms in which one of them benefits from the relation and does not harm it.
- A commensalism relationship between the hippopotamus and some birds (fig.57). Both benefit from each other. A bird has a delicious meal from the ticks hidden in the folds of the hippopotamus skin.
- Over the Nile, you see some birds standing near the river side close to the lying crocdiles. These birds approach to these crocodiles in an entire safety. Crocodiles open their mouths and let those birds get inside with no fear to pick up the remains of food among crocodiles' teeth.

Fig. (57)
The commensalism among birds and hippopotamus.

Fig. (58) The sponge.

- Tiny aquatic living organisms get shelter and food from canals and fissures of a sponge (fig.58) which neither benefits nor harmed from the existence of these living organisms.

- Give other examples that show the commensalism relationship among living organisms.

C Parasitism

It is a relationship between two different kinds of living organisms: one benefits from the other and is known as "the parasite" while the other one is harmed and known as "the host". In this relationship. the parasite depends entirely on the host to get its food requirements. This relation causes weakness and feebleness to the host but it doesn't kill it as what predators do with their preys. Why is the host death considered a loss to the parasite?.

Types of parasitism

Parasites may live externally on the host's body feeding by sucking its blood, such as lice, bugs, mosquitoes (fig.59), fleas and ticks. They also may live internally inside the host body, sharing the host its digested food or feeding on the contents of its tissues and cells such as liver worms and tape worms.

Fig. (59)
Mosquitoes parasitize on man and suck his blood

- Classify: Are the parasites in figures (60) below exernal of internal?.

Ascaris worm
Is it internal or external parasite?.

Bilharzia worm.
Is it internal or external parasite?.

The jawless lamprey while it suck the fish blood. Is it internal or external parasite?.

Fig. (62)
Some types of parasites

Harms of parasitism

- Diseases caused by parasites are countless. Filaria worm cause elephantiasis to man, some types of mosquitoes infect man with malaria disease, and some types of fleas convey small pox to man.
  - Tell two diseases caused by parasites to man.

Science and animal health

Did you know that some dogs, cats and birds which we have at home can be hurt by worms. Some of these worms can infect human.

To protect man and these living organisms, follow the proper way of cleaning and visit the veterinaries regularly to check them.

3 Saprophytism

Activity Saprophytic organisms

- **Steps:**
  1. Splash some water drops on a slice of bread. Put the splashed bread in a plastic sac and close it firmly. Leave it in a quite dark place (fig.61).
  2. Observe the bread daily.
     - Caution: Don't open the sac or inhale the air inside it and wash your hands after performing the activity.
  3. Record your observations:
     - Did the bread remain as it is or change?
     - What is the color of the layer formed on the bread?
     - What do we name the bread when it changes?
     - The change that happened to the bread is caused by a kind of organisms known as bread mold fungus.
     - Where can this fungus get its food?

Fig.(61)

What happened to the bread after closing the sac for two weeks?

- In saprophytism the organisms which are known as the saprophytes or decomposers get their food by decomposing food remains or the bodies of dead organisms. Examples of these living organisms are some fungi such as mushroom (Fig.62), penicillium and bread mold. Gather some different pictures of sarophytic organisms and write a comment on each.

Fig.(62)
Mushroom fungus.

Activity **Determine the food relationships among living organisms**

- Work with your classmates to make a fish aquarium tank (fig. 63) as follows:

1. Use a glass tank with a suitable size.
2. Put an amount of sand and small gravel in the bottom of the tank. Add some snails with a little mud.
3. Fill the tank with water and leave it for 24 hours.
4. Add some different living organisms to the tank such as: Elodea plant, tiny worms, snails and some colored fish.
5. Supply the tank with a small oxygen pump to renew the air dissolved in water.
6. Leave the tank in a place where indirect sunlight reaches it. Cover it with a glass sheet and leave a space under it.

Fig. (63)
Fish aquarium tank.

7 Observe and identify the relationships among living organisms inside the glass tank as follow:

- How can fish, snails and worms benefit from Elodea plant ?

  .....

- How can Elodea plant benefit from fish, snails and worms?

  .....

- What is the importance of worms and some tiny organisms which are found with mud and small gravel in the bottom of the tank?

  .....

Fig. (64)
Another fish aquarium containing Elodea plant, snails and gravel.

Lesson (3 - 1) Exercises

1 Show the type of food relationship illustrated in the following figures:

2 Complete the following sentences:

a The interaction between a cat and a rat is considered as an example of ..... relationship.

b The relation between honeybees and plant flowers is an example of .....relationship.

c The relationship between fungi and organisms dead bodies is an example of .....

d Billharzia worms hurt ..... and are named ..... while the organisms it hurts are called hosts.

3 Write the scientific term of each of the following:

a A temporary relationship between two different organisms with a benefit to one and a harm to the other.

b A superficial relationship between two organisms, one benefits while the other neither benefit nor harmed.

c The relationship between two organisms that benefit from each other.

Lesson (3 - 2)

Environmental balance

Objectives

By the end of this lesson, the student should be able to:

- Identify the concept of the environmental balance.
- Show the effect of predation on the environmental balance.
- Identify the effect of saprophytism on the environmental balance.
- Express the importance of environment protection.

The ecosystem

The figure below represents a natural area, that contains some living organisms (.....,.....) and some non-living things (.....,.....). These ecosystem 2 components are collectively called the Ecosystem.

Fig. (65)
A small ecosystem

Predict : What happens?
When rabbits are introduced into an island has a suitable environment with much food and no natural enemies.

Ecosystem is any natural area including living organisms (such as plants and animals) and non-living things (such as water, soil, air and the components of air including gases).

Ecosystem may be small like a pond or large as the desert.

The components of the ecosystem

The ecosystem consists of non-living components as air, soil and water ..., and other living organisms like plants, fungi, algae and animals.

Activity **Living together**

- Look at (Fig. 66) . It represents a stable ecosystem and different relations among living organisms in the environment. Define the relationships between its components.
- The relation between the plant and soil:
- The relation between plants and animals:
- The relation among different animals.
- Write a paragraphs on this balance to describe the relationships among those living organisms and what surrounds them of the environmental components.

Fig. (66)
Living together in the balanced ecosystem

Environmental balance

It means the balance among the components of the ecosystem. The ecosystems vary; they may be small areas as a piece of land or a water pond. They may be large as a forest , desert or an ocean.

They may be very large, so the universe can be considered a unified ecosystem.

The interaction among the environment components is a continuous process that leads to keep the balance on unless a disturbance arises as a result of changing the natural circumstances or the interference of man (fig. 67).

Fig. (67)
The environment remains in balance unless a disturbance arises as a result of changing the natural conditions or the interference of man.

Natural changes

Changing of natural circumstances lead to the disappearance of some organisms and the appearance of others. This leads to imbalance which takes a period of time, long or short until a new balance occurs.

Fig. (68)
Dinosaur is an example of extinct animals due to the changing of natural conditions in the environment.

The best indication for this is the disappearance of huge reptiles (dinosaurs -Fig.68) as a result of changing the natural circumstances of the environment in ancient eras which led to their extinction.

The effect of predation on the environmental balance:

Predation relationship organizes the numbers of preys populations.

In this way, it plays an important role in keeping the balance of the ecosystem.

Predators help preys to get rid of weak or sick members and let strong ones in preys populations to preserve their existence and to reproduce adding strong members to the population.

Fig. (69)
Two types of different birds which compete each other on the same limited resource of food.

It is worth to mention that if there were no predators, populations of preys would increase in number to an extent that the available food resources become insufficient with their food requirements. So, competition appears among their populations (fig.69).

They will die or will not find shelter or become weak and feeble. Thus, they will become preys to diseases which lead to their death.

Give some examples to this phenomenon.

The effects of saprophytism on the environmental balance

Saprophytism has a major importance in the ecosystem. Saprophytic organisms such as bacteria and fungi work on decomposing the bodies of dead organisms (fig.70) so we would say these scavengers give great services to the ecosystem.

Fig. (70)
Saprophytes such as bacteria and fungi feed on dead organisms and give great services to the ecosystem.

These living organisms complete the food chains and webs, and they also recycle the chemical elements within the ecosystem. Without the activities of those scavengers, the Earth's surface would be covered permanently with the bodies of dead organisms and many chemical elements such as carbon, nitrogen and sulphur would remain inside the bodies of dead organisms. As a result, new living organisms would never get any supplies or resources of these elements.

- How can man benefit from saprophytic organisms?
- What are the industries which depend on the saprophytism relationship?

Lesson (3 - 2) Exercises

1. **What happens if .....?**
   a. Bacteria disappear completely.
   b. Predators disappear from an environment including few rabbits.

2. **What is the effect of saprophytism on the environmental balance?**

3. **What is meant by .....?**
   a. Ecosystem.
   b. Environmental balance.

4. **How has man benefited from saprophytic organisms in industry?**

Evaluate your understanding

- Through such exercise, you can evaluate how much you understand the main concepts in this unit.
- Examine the figures, then answer the following questions.

- Ascaris worm parasitizes (externally-internally) on man.
- In this food relationships man is the ..... and the worm is the .....
  .....
- Give another examples of the parasitism relationship. .....
  .....

- The figure shows the ..... relationship.
- Give another examples of this relationship shown in the figure. .....
  .....
- Are there predator plants?
  .....
- Explain your answer .....
  .....

Evaluate your understanding

- Show the kind of food relationship between the bee and the flower .....
.....
.....

- Which gets the benefits from this relationship? .....
.....
.....

- Give another examples of this relationship. .....
.....
.....

- The figure shows a food relationship between two organisms. This relationship is known as .....

- How the mold gets its food?
.....
.....

- Give another examples of this food relationship. .....
.....
.....

Activities

- During your studying of this unit, you have a set of tasks and activities.

- **1st: Design a school bulletin:**
  - Share your classmates under supervision of your teacher to design a school publication concerns the topics of the unit.
  - Use the figures and photos included in the unit to support the topics of the bulletin. The suggesting topics are: the different food relationships among living organism and the energy pathway through food chains and webs.
- **2nd: Interesting topics:**
  - Use the school library and internet sites to search about some topics related to the unit, as parastism and importance of saprophytism.
- **3rd: Make models:**
  - Use the available materials in your environment to make models of a balanced ecosystem and effect of predation on the environmental balance.
- **4th: School broadcasting:**
  - Prepare an essay about one of the previous topics or other and present it thought the school broadcasting.

Activities

- **5th: Field visit:**
  - Share your classmates under supervision of your teacher in visiting balanced ecosystem. Where huge electromagnets are used.
- **6th: Rewrite a topic from this unit:**
  - Choose a topic from this unit.
  - Read it again and divide it into paragraphs.
  - Research about this topic in books of school library or through the internet.
  - Rewrite the topic on your own view.
  - Display the topic to your teacher and your classmates.
- **7th: The team activities**
  - Work with your classmates preparing a poster about the most important relations among different living organisms.
  - Write a paragraph about the effect of predation and saprophytism on the environmental balance.
  - Write a report about the environmental unbalance due to man interference in the environment.
  - **8th: Designing of a poster:**
  - Choose a topic from this unit and work with your classmates under supervision of your teacher to design a poster about this topic.

Unit 3 General exercises

1 Complete the following sentences:

a The relation between honeybees and flowers is an example of .....

b The interaction between a cat and a rat is an example of .....

c Fungi are considered as ..... living organisms.

d Bilharzia worms parasitize on ..... and are known as ..... whereas the harmed organism is known is as .....

2 Choose one of the following terms to form a proper food chain:

Snake - wheat - sheep - rat

a The producer in the chain is .....

b The predator in the chain is .....

c The herbivore in the chain is .....

d The relationship between a snake and a rat is known as .....

3 Put (✓) or (✘):

a Fungi feeding on the dead organisms bodies is called saprophytes.

b Among the different types of fungi, mushroom is distinguished by its ability to make its food.

c Spiders use their woven nets for catching insects.

4 Give reasons:

a Plants are the main food for lions, although lions are carnivorous.

b The relationship between sharks and remora fish is a commensalism.

c Decomposers are considered the guards of nature.

d Tape worm is a parasite.

5 What is the effect of saprophytes on the environmental balance?

6 What is meant by:

a Ecosystem

b Environmental balance.

7 Choose the correct answer:

a Green plants are considered as ..... organisms.
1 decomposer 2 producer 3 consumer

b An example of decomposers is the .....
1 fungi 2 rabbits 3 plants

c Plants get energy from .....
1 oxygen 2 chlorophyll 3 sunlight

d The process of photosynthesis is done by a ..... living organism.
1 producer 2 decomposer 3 consumer

e Bilharzia worms are considered as ..... organisms.
1 producer 2 parasitic 3 decomposer

8 Write the scientific term that expresses each of the following sentences:

a A temporary relationship between two different living organisms that benefits one and harms the other.

b A relation between two living organisms that benefit from each other.

c A superficial relation between two living organisms that one benefits and the other doesn't benefit or harm the first one.

9 What do you expect to happen in the following cases?

a If the number of plants decreases in a food chain that consists of rats and owls.

b If the atmosphere doesn't work as a refinery to sun energy.

c If herbivores decrease in the environment.

d If food producers decrease in the environment.

e If man continues cutting forest trees.

f If bacteria completely disappear.

g If predators disappear from an environment including few rabbits.

First Term General Revision

1 Complete each of the following statements:

a Like magnetic poles ..... and dislike ones ..... each other.

b Fungi are considered as .....

c ....., ... and ..... are primary colours.

d Electromagnet consists of ..... and .....

e The food relationship among cat and rat is .....

f Decomposers are considered the ..... of nature.

g Solution is a type of .....

h The magnetic force is most powerful at the ..... of the magnet.

i Green plants are ..... organisms.

j Bilharzia worm is a .....

k The ..... contains a small light magnet moves freely around a fixed axis.

l The food relationship in which both organisms benefit from each other is known as .....

2 Choose the correct answer:

a The dynamo .....

1 changes the electric energy into the mechanical one

2 changes the mechanical energy into the electric one

3 changes the mechanical energy into the thermal one

b Bacteria is a .....

1 producer 2 parasite 3 decomposer

c Red, green and blue light are ..... lights.

1 primary 2 secondary 3 complementary

d The process of photosynthesis is done by a ..... living organism.

1 producer 2 decomposer 3 consumer

e Light transmits in ..... lines.
1 curved 2 broken 3 straight

f When a magnet is hanged freely, its north pole refers towards the .....
1 north 2 south 3 east

g Most mixtures formed by dissolving in liquids are .....
1 homogeneous 2 heterogenous 3 identical

e Green plants are considered as ..... organisms.
1 decomposers 2 producers 3 consumers

3 Put (✓) or (✗) and correct the underlined word if it is not correct to make the statements right :

a When water and suger get mixed up, a heterogeneous mixture is formed.
b The less the amount of solvent decreases, the more the solution time increases.
c Fungi feeding on the dead organisms bodies are called saprophytes.
d Among the different types of fungi, mushroom is distinguished by its ability to make its food.
e Transparent objects have the same colour of the light that doesn't travel through.
f Opaque objects have the same colour of the light which the object reflects.
g Cyan, purple and yellow are the primary colours.
h Solubility speed decreases by shaking and rising the temperature.
i The solubility speed of solids increases by grinding.
j Increasing the amount of solvent decreases the speed of solubility.
k Mixtures can be separated by the magnetic attraction, filtration and evaporation.

l Mixing red, green and blue colours produces the white colour .
m Aluminium gets attracted to the magnet.
n An electric current can be generated by using a magnet.
o Magnetism is always related with electricity.

4 Give reasons:

a White light can be separated.
b Dynamo can change mechanical energy into electric one.
c Solution is a type of mixtures.
d The parasite does not kill its host.
e Parasitism may be external or internal.
f Some materials are magnetic.
g There are different types of solutions.
h Green plants can make their own food.
i Some mixtures can be separated by using a separating funnel.
j Predation is a temporary food relationship.
k Rainbow can be seen after heavy rain falling.

5 What is the difference between each pair of the following:

a The transparent and obaque materials.
b The primary and secondary colours.
c The solvent and the solute.
d The magnetic and non-magnetic materials.
e The external and internal parasites.
f Parasitism and saprophytism.
g The solution and the mixture.
h The homogeneous and heterogeneous mixtures.
i The solution and the suspension.

Exercise (1)

1 Write the scientific term for each of the following:

a The materials that are attracted to the magnet

b A region on the magnet has the most powerful force of attraction.

c A region around the magnet at which the effect of the magnetism appear.

d Living organisms which decompose dead organisms.

e Food relationships between organisms get their food by devouring other organisms.

2 Complete the following statements:

a The materials that objects can be seen throught, are called .....

b The opaque materials seems to be coloured withe ..... .

c The red, green and blue lights are called .....

d The scientific idea of dynamo depends on the conversion of the .....energy into ..... energy.

e Seafarers use ..... during their navigation in oceans.

f ..... is considered as a common solvent due to its ability to dissolve several substances.

i ..... is a way of separating mixtures.

3 Compare between each pair of the following;

a Transparent and opaque materials.

b Primary and secondary lights.

c Magnetic materials and nonmagnetic materials.

d Solvent and solute.

e Mixture and solution.

f Parasitism and saprophytism.

g Externally parasites and internally parasites

4 Name the equipment that can be used in each case:

a Separation of light into seven colours.

b Fixing the north and south directions.

c Converting of mechanical energy into electric energy

d Separating a mixture of oil and water.

5 Choose the number which indicates the correct answer :

a Light propagates in ..... lines.

1- Straight 2- curved 3- refracted

b Light cannot be pass through ..... materials.

1- transparent 2- semi transparent 3- opaque

c ..... is a magnetic material.

1- iron 2- aluminum 3- copper

d When you mix two or more kinds of matters together, the produced matter is called .....

1- element 2- compound 3- mixture

e ..... is used to separate a mixture of oil and water.

1- Evaporation 2- Filtration 3- separating funnel

f The material that dissolves to produce solution is called .....

1- solvent 2- solute 3- mixture

g ..... takes place by some living organisms to hide from their enemies.

1- commensalism 2- parasitism 3- camouflage

h Predation acts to ..... the number of prey.

1- constant 2- double 3-decrease

Exercise (2)

Question (1)

Complete the following statements:

1- Light reflects when it falls on ..... surface.

2- Light reflects when it transfer between two ..... media.

3- Compass consists of ..... freely move.

4- ..... and .....are ways of mixing solid materials

5- Some autotrophic plants have to prey insects to get their required elements for making .....

Question (2):

Compare between each two pairs:

1- Regular and irregular reflection

2- Magnetic and non-magnetic materials.

3- Commensalism and parasitism.

Question (3);

What happens in each case .....?

1- Fixing a magnetic needle on a piece of cork in a basin contains water.

2- Passing of electric current in a wire wrapped around a rod of soft iron.

3- Stirring two equal amounts of sugar in two beakers contain unequal amounts of water.

Question (4);

Put (√) or (X) in front of each of the following then correct the wrong one:

1- Mixtures can be formed by shaking, grinding or stirring. ( )

2- Filtration is used to separate a mixture of solid materials. ( )

3- Some living organisms can change its colour to simulate the colours of the evironment where it lives to hide from their enemies. ( )

Question (5);

Answer the following questions:

1- How you can prove experimentally that light propagates in straight line?

2- What is the kind of materials can be used to cover windows of photographic rooms for imaging?

3- Illustrate the food relationships between sponge animal and other aquatic tiny animals

Question (6):

Write the scientific term for each of the following:

1- Materials that objects can be seen clearly through it.

2- Objects can be seen with the colour of its reflected light.

3- A temporary relationship which ends up by devouring the prey or a part of it.

Question (7):

Explain the following briefly on:

1- Formation of shadows.

2- The light transmission through different materials.

3- Rainbow

4- Idea of making dynamo.

5- Factors affecting solubility process.

Exercise (2)

Question (8):

What is meant by each of the following ?

1- Reflection of light. 2- Ecosystem

Question (9);

Give reasons for each of the following :

1- The transparent and semitransparent bodies bodies appear coloured with the lights that pass throught it?.

2- No mixing will happen on adding sand to water.

3- Saprophytic organisms feed on the bodies of dead organisms.

Exercise (3)

Question (1):

Complete the following statements:

1- Strawberry fruit seem to be in red colour because it reflected only the ..... colour.

2- As the light falls on the green grass, the grass must absorb ..... colors except .....

3- On mixing all the seven spectrum colours, the ..... is produced.

4- The ancient Greek discovered the black rocks in a region called ....., these rocks attract the materials which made of .....

5- Matter can be divided into ..... and ..... due to their magnetic abilities.

6- The electric magnet losses its magnetism when .....

7- ..... is used to pick up the huge iron masses.

8- Some human activities as ..... leads to destroy environmental balance.

Question (2);

Write down the scientific term :

1- The natural area including living organisms and non-living things.

2- A kind of parasites may live on the host's body to get their food.

3- The organisms which help to get rid of dead organisms.

4- The material at which the solute disappear in it.

5- The mixture results from the solubility of solids in liquid.

6- The process of formation a solution.

7- The light results from the mixing of red, blue and green colours.

8- The light results from mixing the seven spectrum colours.

Exercise (3)

Question (3);

Choose the correct answer ;

1- Light rays that can be seen are called.....

a) Visible spectrum. b) Infrared

c) Ultraviolet d) all the previous

2- We can see things as a result of .....of rays.

a) reflection b) refraction

c) Absorption d) analysis

3- Which of the following is considered as a secondary colour?

a) yellow b) green

c) blue d) red

4- The natural magnet is discovered since ..... ago.

a)2000 b) 3500

c) 2050 d) 2500

5- When the magnet is hanged freely it will take the direction.....

a) north and east b)east and south

c) south and north d) west and east

6- The compass contains .....

a) horse shoe magnet b) bar magnet

c) small magnetic needle d) ring magnet

7- When the compass is put beside a wire carrying electric current ----------

a) no deflection occurs. b) the needle deflects.

c) the needle destroyed d) no correct answer.

8- The apple juice is considered as .....

a)liquid mixture b) solution

c) solid mixture d) a &b together.

9- ..... ejects a black colour fluid in the surrounding water when attacked by its enemies.

a) Frog b) Sepia

c) Butterfly d) Chameleon

10- The animal that devouring other animal is called .....

a) parasite b) host

c) prey d) predator

Question (4):

Give reason for each of the following:

1- The relationship between the termites and protozoa is an example for mutualism relationship.

2- The time of dissolving sodium chloride is differing than time of dissolving sodium carbonate.

3- Water is considered as a common solvent.

4- Air is a mixture.

5- The magnet is used to separate iron filings and sand.

6- The deviation of the ammeter's pointer when move a wire between the two poles of the magnet up and down.

7- Aluminum, copper and glass are non-magnetic materials.

8- The green colour is considered as a primary colour.

Exercise (3)

9- It is preferred to wear black clothes in winter.

10- The moon cannot be considered as a source of light.

11- Images can be formed by using narrow holes.

Question (5):

Put (√) or (X) in front of each of the following then correct the wrong one:

1- The cartoon paper is an opaque material. ( )

2- The body nearer to the light source has the greater shadow. ( )

3- The red colour is the first spectrum light, while the violet colour is the last spectrum light. ( )

4- The green table reflected all light colours. ( )

5- When you look to a black body through a glass plate, the body and the plate are seem with the same colour. ( )

6- The magnetic field can be seen by detected iron filings. ( )

7- The magnet has three poles. ( )

8- The electromagnet losses its power when the electric current is cut. ( )

9- The dynamo of the bicycle is in the shape of a cube touches the tire. ( )

10- The oil and water can be separated by filtration. ( )

11- Solvent + solute solubility process solution. ( )

12- The relation between flaria worm and man is a parasitism relationship ( )

13- Predation is a temporary relationship between predator and prey. ( )

Question (6):

What's meant by each of the following.....:

1- Visible light
2- Opaque material.
3- Secondary lights.
4- Magnetic materials.
5- Magnetic field.
6- Electromagnet.
7- Pure substance.
8- Mixture
9- Camouflage.
10- Parasitism.
11- Ecosystem.
12- Mutualism.

Question (7):

Compare between each of the following:

1- Saprophytism and parasitism.
2- Reflection and refraction of light.
3- Regular and irregular reflection.
4- Natural magnet and electromagnet.
5- Pure substances and mixtures.

Question (8):

Choose from the column (A) which suitable with column (B):

(1)

column (A)	column (B)
a –A food relationship between man and liver worm. b - A food relationship between bean plant and nodular bacteria. c- A food relationship between cat and rat d- A food relationship between fungi and splashed bread.	1- Predation 2- Externally parasitism 3- Commensalism. 4- Saprophytism 5- internally parasitism

Exercise (3)

(2)

column (A)	column (B)
a- A mosquito	1- Causes elephantiasis
b- Flaria worm	2- Conveys small pox
c- Bread mould fungus	3- Causes malaria
d- Fleas	4- Causes anemia
e- Ascaris worms	5- Causes bread mould
	6- Causes plague

(3)

column (A)	column (B)
a- light	1- Opaque material.
b- Shadow	2- Separate light into seven colors
c- Glass	3- Transparent material.
d- Cartoon paper	4- Propagates in straight lines.
e- Prism	5- Reflects sun light.
	6- A dark area formed behind a body exposed to light

(4)

column (A)	column (B)
a- Salt	1- Can be separated by separation funnel.
b- Oil and water mixture.	2- Can be separated by evaporation.
c- Pure water.	3- Can be separated by filtration.
d- Iron filings and sand mixture.	4- Pure substance.
	5- Can be separated by using a magnet.

Question (9):

What happens in each case of the following:

1- You look at your image through a transparent material.

2- When you look at the mirror.

3- When you look at a spoon put in a beaker contains water.

4- On passage of white light through a prism.

5- On mixing the seven colours.

6- On mixing the red colour with the green colour.

7- When a magnet is hanged freely to move.

8- When the north pole of a magnet get nearer to a south pole for other magnet.

9- On moving a wire up and down between the two poles of a magnet.

10- Cutting down of trees.

11- Absence of preys in the ecosystem.

12- Chemical elements are not recycled by saprophytic organisms in the ecosystem.

Question (10):

Essay questions:

1. **Mention the kind of food relationship between each pairs of the following:**

a. The lion and a deer.

b. Nodular bacteria and bean plant.

2. **Which process is faster and why :**

a. The dissolving of a quantity of salt in hot water, and dissolving the same quantity of salt in the same quantity of cold water.

b. The dissolving of a quantity of sugar in water with stirring, and dissolving the same quantity of sugar in the same quantity of water without stirring.

Essay questions:

c The dissolving of a quantity of salt in 100 mill liter of water, and dissolving the same quantity of salt in 300 mill liter of water.

3 Look at the opposite figure then answer the following questions:

a What's the mixture that can be separated in the figure?

b Mention the way of separation in this case? Give the reason?

4 Mention the function of each of the following:

a Filter paper

b Electric magnet

c Compass

d Prism

5 Compare between the dynamo and the electromagnet from the point of view of their scientific idea.

6 Mention the properties of the magnet.

7 Look at the opposite figure then answer the following questions:

a The opposite figure explains ..... phenomenon.

b Velocity of light in air is ..... than the velocity of light in water.

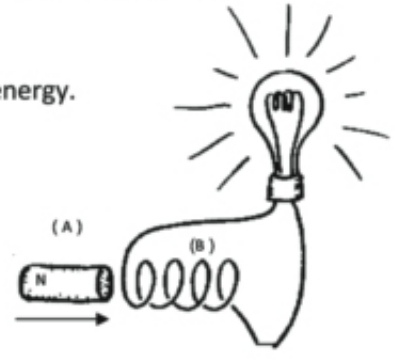
8 Look at the opposite figure then complete the following:

a The symbol (a) indicates ..... and the symbol (b) indicates .....

b When (a) moves inside (b) ..... must be generated.

c The apparatus converts ..... energy into ..... energy.

d The scientific idea of this apparatus is .....



Model Exam (1)

Question (1):

Write down the scientific term for each of the following:

(1) The darkened area that formed as a result of falling light on an opaque object.

(2) The force by which the magnet attracts some materials.

(3) A device used to convert kinetic energy into electric energy.

Question (2):

Put (√)or (x) inrront of the each statement of the following :

(1) Solvent is a liquid used to dissolve the solid material in it. ( )

(2) There are no food relationships between living organisms. ( )

(3) The interaction between among environmental components leads to unbalance of ecosystem. ( )

Question (3):

Complete the following statements:

(1) The light..... when transfers between two different transparent media.

(2) The magnetic forces concentrated at ..... of the magnet.

(3) The sepia ejects a black fluid in the surrounding to .....

Question (4):

Prove experimentally that:

(1) Magnetism can be generated by using electric current.

(2) Oil and water cannot be mixed.

Model Exam(2)

Question (1):

Write down the scientific term for each of the following:

(1) The materials that doesn`t allow light to pass through, and objects can`t be seen through it.

(2) The space around the magnet in which the effect of magnetic force appears.

(3) A process needs the presence of solvent and solute.

Question (2):

Put (√) or (x) in front of the each statement of the following and correct the wrong ones:

(1) Salt and water are mixed together by stirring or heating. ( )

(2) Filtration is used to separate soluble solid materials. ( )

(3) The balance of ecosystem occurs due interfere of man ( )

Question (3):

Compare between each of the following in a table (give examples):

(1) Magnetic materials and non-magnetic materials.

(2) Parasitism and saprophytism.

Question (4):

Prove experimentally that:

(1) Light can be separated into seven colours.

(2) The effect of temperature on solubility.

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تم الطبع بالشروق الحديثة ـ القاهرة
بالمواصفات الفنية الآتية

عدد الصفحـات : ١١٦ صفحة

المقـــــــاس : ٥٧ × ٨٢ سم

نـــوع الـــورق : لا يقل الداخلى عن ٨٠ جرام والغلاف ٢٠٠ جرام

ألـــوان الطبـــع : ٤ لون للداخلى والغلاف

جميع حقوق الطبع محفوظة لوزارة التربية والتعليم
داخل جمهورية مصر العربية

الشروق
الحديثة للطباعة والتغليف
القاهرة : ٨ شارع سيبويه المصرى ـ ت : ٢٤٠٢٣٣٩٩ ـ فاكس : ٢٤٠٣٧٥٦٧ (٠٢)
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